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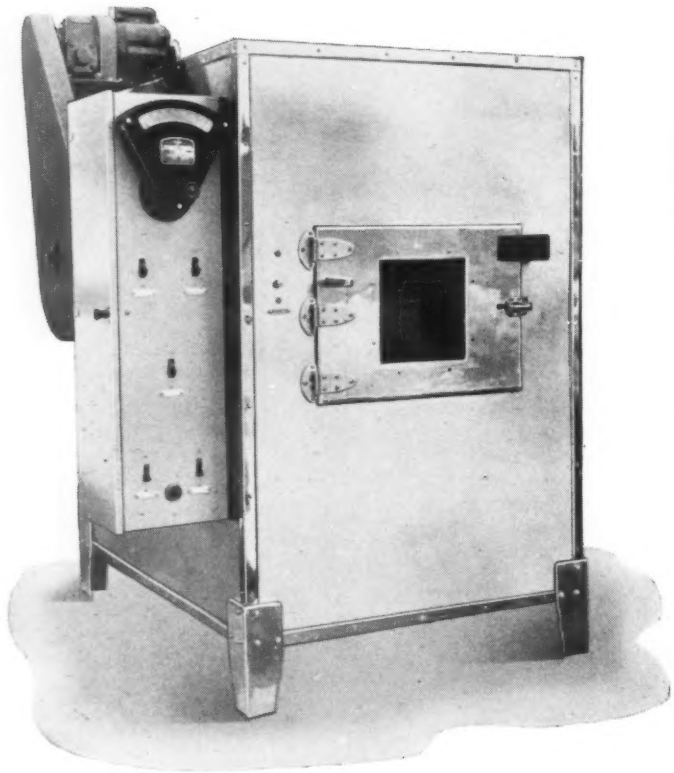

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The Vital Story of MACARONI* ENRICHMENT

by Science Writer

This is the fourth article in a series devoted to the story of cereal enrichment

Dramatic results have been recorded about the value of enrichment in improving health. From the United States, the Bataan peninsula in the Philippines, Newfoundland and many other parts of the world comes word of the great benefits which result from enrichment.

For years, some forward-looking manufacturers of macaroni and noodle products have used enrichment to make their good foods better. They know that enrichment restores important vitamin and mineral values which are unavoidably lost in milling, and they recognize their responsibility to provide the greatest health-building benefits for the public.

Enrichment is really a simple process. It adds the following essential elements to the food during manufacture.

Thiamine—also called vitamin B_1. This vitamin helps to build physical and mental health. It is essential for normal appetite, intestinal activity and sound nerves.

Riboflavin—also called vitamin B_2. This vitamin helps to keep body tissues healthy and to maintain proper function of the eyes. It is essential for growth.

Niacin—another "B" vitamin, is needed for healthy body tissues. Its use in the American diet has done much to make a serious disease called pellagra disappear.

Iron—is a mineral used in all enrichment. It is essential for making good, red blood and preventing nutritional anemia.

Products made from semolina may be enriched by two methods. One uses small square wafers which contain all the vitamins and iron necessary to enrich 100 lbs. The wafers break up in a small amount of water which is then added to the paste. For manufacturers who use the continuous press method, a powdered concentrate of the vitamins and iron, called a premix, is available. This is added by a mechanical feeding device.

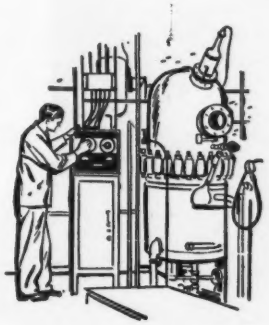
**Macaroni is used here in the generic sense. It includes all alimentary pastes: macaroni, spaghetti, pastina, noodles.*

These are the minimum and maximum levels, in milligrams per pound, required by the Federal Definitions and Standards of Identity for enriched alimentary pastes.

	Min.	*Max.*
Thiamine (vitamin B_1)	4.0	5.0
Riboflavin (vitamin B_2)	1.7	2.2
Niacin	27.0	34.0
Iron	13.0	16.5

NOTE: These levels allow for 30% to 50% losses in kitchen procedures.

Nowadays scientists are able to "build" duplicates of many of Nature's essential complexes in the laboratory. This has happened with many vitamins. First the chemical composition is learned and the pure substance is isolated. Then a "duplicate" is made which is identical chemically and biologically with Nature's product. A vitamin is a vitamin regardless of its source just as salt is salt whether it comes from a mine or is evaporated from the sea. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.



The Hoffmann-La Roche people, who produce a good percent of the vitamins used in enrichment, use amazingly complex processes with scientific production controls. This requires modern, special equipment filling whole buildings, each one a city block square and many stories high.

The combination of scientific research, thorough know-how and mammoth manufacturing processes—plus the far-sightedness of leaders in the macaroni industry—is helping vitally to make good macaroni products better.

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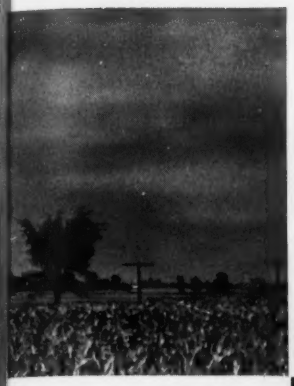

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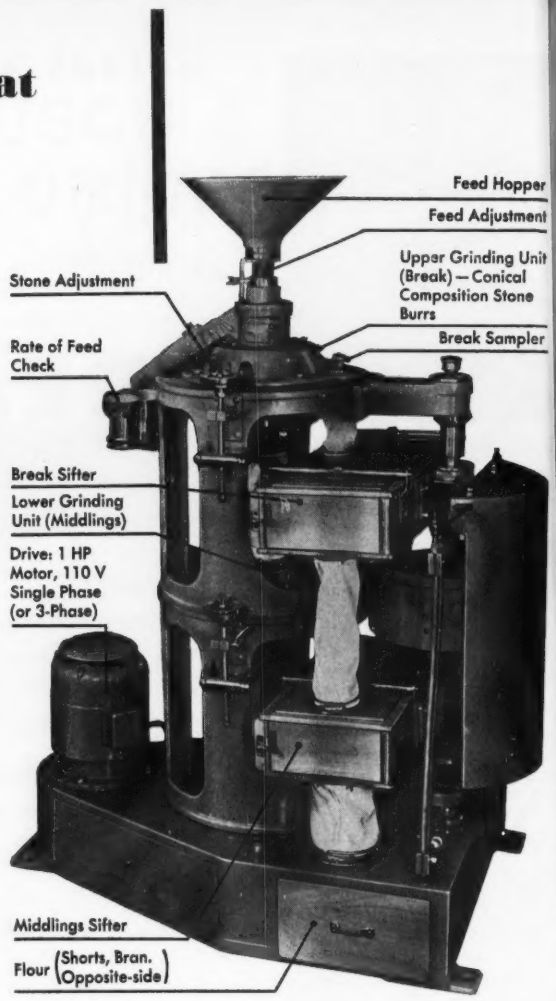

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Editorial

In a few weeks we shall gather in the city of Washington for our 44th Annual Meeting. One need only glance through the preliminary program included in the March issue of Cereal Science Today to become aware that Program Chairman Frank E. Horan has designed this program for the benefit of "chemists and technologists concerned with the production and processing of the cereal grains, whose interests range from the improvement of crops to the final uses of cereal products as food for man and animals."

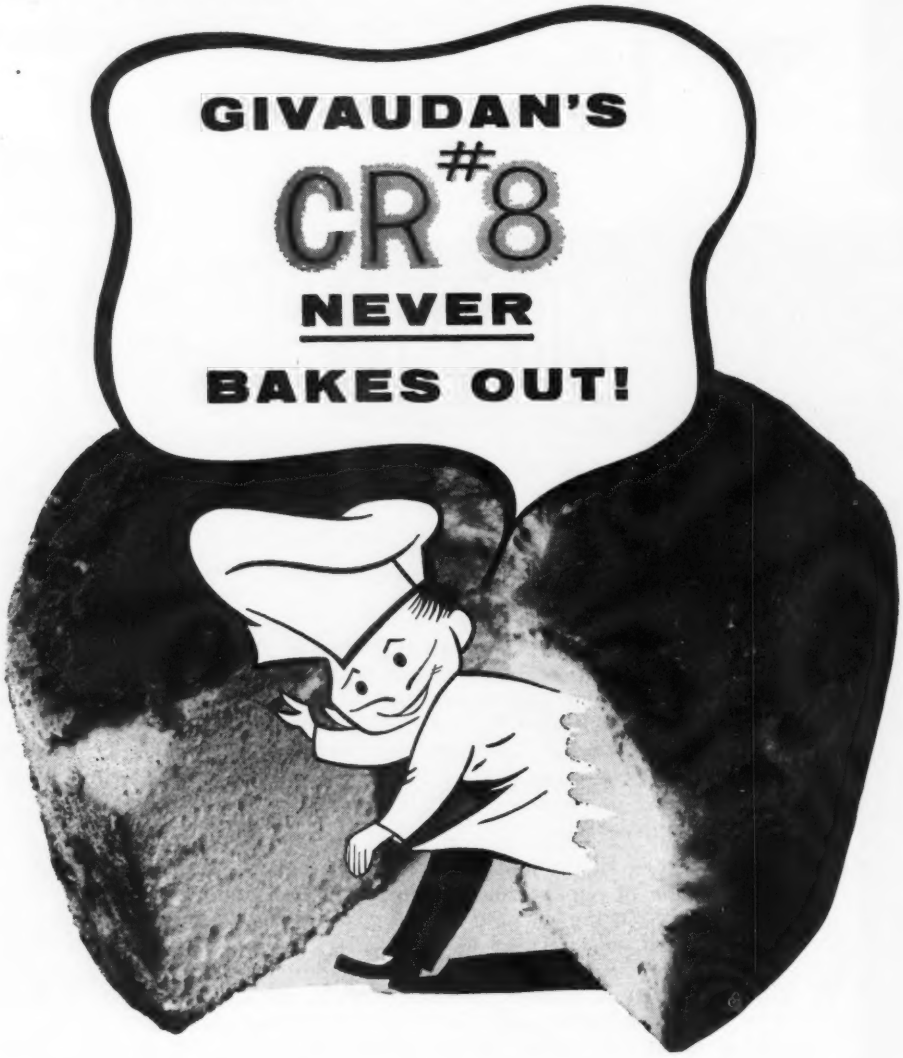
One of the major problems a program chairman has to face is the selection of papers that will interest cereal chemists engaged in pure research, in teaching, in process and product development and in quality control in a wide variety of fields. As the time of the annual meeting draws near, each cereal chemist awaits with impatience the arrival of the preliminary program, and he checks through it eagerly, looking for titles of papers that deal with his particular interests. The program chairman must keep in mind that the cereal chemist will want to show his employer that the expense of sending him to the annual meeting is well justified, and that he will return to his job armed with new information and fired with new enthusiasm.

The program for the 44th Annual Meeting holds something of interest to every cereal chemist. Because we are meeting in the nation's capital, it is fitting that we should be reminded of our responsibilities to Government, and that we should be shown how much the Government is contributing to our fields of activity. As I said in a holiday greeting published in a milling journal last December, we cereal chemists are the "custodians of the quality and uniformity of the foods that form the basis of the diet of the great majority of mankind." So it is fitting that we should be reminded of our global responsibilities when we meet in Washington.

Local Arrangements Chairman Kenton Harris and his able co-chairmen have done a splendid job in planning an annual meeting which is sure to be a memorable one. Come to Washington! You can't afford to miss it!

Clinton L. Brooke

A complementary additive to vanilla flavors...



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PRESENT AND PROSPECTIVE APPLICATIONS OF Phosphates in Foods

By James Tucker, Central Research Laboratory, Victor Chemical Works, Chicago Heights, Illinois*

THE GROWING ROLE of phosphates in the most important commodity in the world, the food we eat and live by, has been greatly in evidence in the past two decades. Numerous reasons account for this growth. The purity, stability, and safe character of the many compounds available go hand-in-hand with their ability to improve the quality, appearance, and shelf-life of many foods. In fact, many food products on the market today owe their beginning to a specific effect from one of the phosphate compounds.

The list included herein is intended to acquaint you with some of the specific uses of phosphates; it is not necessarily complete in regard to all of the phosphates and their usages.

Phosphates constitute the largest portion of chemical leavening agents going into the food industry. With the ever-increasing number of prepared mixes and the growing use of self-rising flour and self-rising corn meal and of refrigerated doughs, the manufacture of such agents has become an important sector of the chemical industry.

Monocalcium Phosphates

Monocalcium phosphate (MCP) was the first of the phosphates used as a baking acid. There are two principal types available today: the monohydrate and the anhydrous coated. The monohydrate is classified as a very fast-reacting baking acid and therefore has limited applications. These are to be found in pancake mixes, usually in combination with the anhydrous coated MCP; double-acting baking powders; and cookie mixes. It is also used as an acidifying agent in angel-food cakes and as a major constituent of bread improvers.

The development of anhydrous coated MCP was a major improvement in baking acids; the coating retards gas formation over a period of 3 to 5 minutes, and thus makes this product particularly suitable for prepared cake mixes. Another result is a tremendous growth of the self-rising flour and self-rising corn meal industries. Recently, through a nationwide contest among professional home economists, the versatility of self-rising flour was demonstrated: 1,127 recipes were submitted, including cakes, cookies, quick breads, yeast breads, desserts, entrees, pies, and mixes. In cake mixes the coated monocalcium phosphate is used in combination with one or more other baking acids. It is used also in pancake and waffle mixes and in straight phosphate baking powder; for rope prevention in yeast breads; and as an excellent source of calcium enrichment.

Pyrophosphates

Sodium acid pyrophosphate (SAPP) is a very versatile material which can be adjusted in reactivity by manufacturing technique. There are several grades of SAPP available, differing only in their reactivity in a dough and their sensitivity to oven heat. However, because of its inherent characteristic of hydrolyzing to the orthophosphate and its secondary reactions with calcium and proteins of flour, the basic reaction can be materially altered. There is some evidence that the acitivity of enzymes in flour will change the reactivity of the SAPP, particularly the slow-reacting type. Certain flours (usually new-crop flours) have been evaluated which speeded up the reaction of slow-type sodium acid pyrophosphate to three or four times the normal rate.

Food products such as doughnut and cake mixes and refrigerated doughs use a sodium acid pyrophosphate tailor-made by the manufacturer to meet specific requirements in leavening action. A fast-acting SAPP is used in processing of cured meats and in "instant" puddings.

Next in line in reactivity is a pyrophosphate for cake doughnut mixes. This sodium acid pyrophosphate has to form a certain quantity of gas during mixing of the batter and also must have a rapid and uniform response to heat for proper expansion of the doughnuts. An intermediate reactivity satisfies the requirements for most household, bakery, and institutional mixes. Refrigerated doughs require a pyrophosphate with greatly delayed reaction. For canned products a relatively inactive leavening is needed before and during the canning process, but regulated gassing during the proofing period is essential to seal the container. In this type of product the sodium acid pyrophosphate reaction can be controlled to some extent with dry milk and calcium salts and by the quantity of liquid, and, as mentioned earlier, can be altered by the pyrophosphatase enzymes in flour.

The major drawback of sodium acid pyrophosphate in many products is its subsequent hydrolysis to the orthophosphate. Whereas advantage is taken of this characteristic in refrigerated doughs, it is deleterious to the stability of biscuit doughs and cake batters if they are held for any extended period. Hydrolysis of pyrophosphate results in a large loss of carbon dioxide, with accompanying loss in baking properties. The enzymatic reaction has not been blocked, except by partially baking or by freezing of doughs and batters.

Dicalcium Phosphate

Dicalcium phosphate dihydrate has come into use as a baking acid as a result of major developments in short-

* Presented at Midwest Section, AACC, Chicago, Jan. 5, 1959.

enings. Dicalcium phosphate is completely nonreactive in the cold dough or batter but provides acidity late in the baking cycle. The efficiency of the special shortenings is such that specific gravity of cake batters as low as 0.55 can be attained. With such an efficient air-emulsifying characteristic, the chemical leavening agent no longer has to bear the load in respect to expansion of the batter in the oven. In prepared cake mixes, dicalcium phosphate is usually used in combination with the anhydrous coated monocalcium phosphate. Its use with sodium acid pyrophosphate is restricted as a result of apparent interreaction between the two phosphates, resulting in excessive alkalinity. Some large bakeries are converting their cake production to the use of dicalcium phosphate-monocalcium phosphate as the baking acid.

Sodium Aluminum Phosphate

In refrigerated cake batters, although the method still is not completely perfected, a cake that is satisfactory after storage can be obtained by using dicalcium phosphate in combination with a small amount of sodium aluminum phosphate.

Sodium aluminum phosphate is a special product which reacts somewhat slower than sodium acid pyrophosphate. However, this product, which has an N.V. of 100, can be used in prepared cake mixes alone or in combination with coated monocalcium phosphate. The sodium aluminum phosphate gives finer cell structure and thinner cell walls in cakes than does any other baking acid. It assists in more complete bake-out of under-crust water and appears to maintain a moist eating quality longer. Because the residual salts from sodium aluminum phosphate impart no particular flavor to a baked product, it is quite desirable in this respect.

The anhydrous form of sodium aluminum phosphate has been developed. It has a reaction rate similar to that of sodium acid pyrophosphate used in doughnut mixes. It can be used in doughnut mixes to provide satisfactory leavening action and bland flavor, either straight or in combination with sodium acid pyrophosphate. Further work is being carried out to investigate its potentialities.

Although the number of baking acids in use is small, research is constantly going on to develop new ones. Several compounds are developed each year but are rejected for one or more reasons. The ultimate goal is to develop a compound which would be a complete leavening; i.e., a product which would completely volatilize upon the application of heat, leaving no residual salts.

Present and Prospective Uses

Following is a brief listing of some phosphate uses in other foods: mineral supplements; acidulants in angelfood cakes, beverages, and gels; yeast nutrients; meat processing; emulsifiers; buffering agents in cereals, milks, and gels; solubilizing of proteins; controlling of viscosity and stability of meringues, toppings, and chiffons; pH control in beverages and jellies; and stabilizer in ice cream.

One of the most promising and yet least-known prospective uses of phosphates is in protein-phosphate and starch-phosphate reactions. More research is being channeled into this field in the hope that a better understanding of the complex reactions taking place in many of our food products will enable us not only to provide better foods and new types of foods, but to conserve our ever-lessening supply in the face of world population growth.

Phosphates and Their Uses in Foods

PHOSPHATES	APPLICATIONS
Phosphoric acid (H_3PO_4)	Cola drinks; cheese acidification; pectin jellies; synergistic antioxidant with tocopherols; salad acid
Orthophosphate salts (MSP, MCP, MAP, DSP, DCP, DAP, TSP, TCP)	Effervescent pellets, soft drinks, and medicines; milk processing — stabilizer during processing; evaporated milk additive; cheese processing; meats — swelling, emulsifying of fat, water retention during cooking; leavening acids; buffers, firming agents, texturizers; quick-cooking cereals; calcium enrichment; rye bread; alginates; rope prevention; firming of vegetables for processing; yeast and dough improvers
Pyrophosphate salts (SAPP, CAPP, TSPP, TKPP)	Leavening acid; sequestering agent for calcium, magnesium, and iron in water and liquid foods; chocolate drink powders, wetting and swelling; soup thickeners; instant puddings; actomycin, swelling; meats — pumping pickle; stabilizer for low-fat ice cream; solubilizer for rennet casein; breading mixes
Tripolyphosphate salts	(Too akaline for most foods. Equal or better results are often obtained with an ortho-pyro mixture. Listed foods have been improved with the sodium salts.) Meat — swelling (may hydrolyze to ortho); buttermilk — reduces wheying-off; solubilizing agent for polymetaphosphate
Metaphosphate — tri $(NaPO_3)_3$	(Not yet approved for food usage.) Preparation of distarch phosphate
Metaphosphate — tetra $(NaPO_3)_4$	Precipitation of proteins without forming a protein-phosphate complex by pH adjustment. Different types of protein can be recovered — blood, milk, liver extract, corn extract, industrial wastes
Metaphosphate — hexa $(NaPO_3)_x$	Water treatment; ice cream — to improve overrun; process cheese — firms aged cheddars; gelatin — improves foam whip; egg albumen — whipping aid; milk protein + calcium-sequestering agent + H_3PO_4; alginates
Polymetaphosphate, regular and HV	(Usually requires a solubilizing agent, TSPP and DSP.) Fish, meats — sausage, frankfurters, pumping pickle; toppings from milk protein, baked goods; ice cream — prevents wheying-off
Iron phosphates (Sodium iron pyrophosphate, ferric orthophosphate, ferric pyrophosphate)	Enrichment of cereals and flours

A CLEAR ANSWER TO A PERTINENT QUESTION:

Why Design Experiments?

By Gayle W. McElrath, Industrial Engineering Division, Mechanical Engineering Department, University of Minnesota, Minneapolis, Minnesota *

BASICALLY, THE IDEAS of designed experiments are very fundamental and have numerous areas of application in industrial research, engineering, and production. The intent of this paper is twofold: first, to acquaint the reader with the concepts and assumptions ingredient in statistical designs; second, to present examples which illustrate some of the basic properties of designed experiments.

The material presented is not intended to be complete in nature. It is not attempting to suggest many experimental designs together with many applications, nor is it attempting to exhaust all the possibilities of designed experiments. It must follow, then, that the dominant mission of this paper is to establish an appreciation and dynamic interest strong enough to motivate the reader to use designed experiments, together with the appropriate statistical techniques for intelligent analysis of data when the need for such refinement exists.

A person may be called upon to design laboratory or field experiments to test differences between alternate methods, processes, or products. He may also analyze operational problems in industrial establishments by taking samples to give quick estimates of short-run processes or performance forecasts. In addition he may be called on to spot trouble and appraise results. In all of these cases one is faced with the problem of decision-making in the face of random variability.

It is well known that the major objectives of statistical quality control techniques are to separate significant information, point out action lines, and to predict probable outcomes in order that good judgment may be properly focused on significant elements and not "underbrush." To this end such techniques as control charts, acceptance sampling, and process capabilities have been presented and are accepted as effective methods of analysis. However, the area of industrial statistics which deals with the designing of experiments for indicating significant differences and their causes is not used to a degree commensurate with its ability to give reliable answers. These observations are made with the knowledge that this phase of designed experiments and statistical analysis is still in the formative stage with respect to industrial research, engineering, and production.

Gayle W. McElrath joined the Mathematics and Mechanics Dept. of the Institute of Technology at the U. of Minnesota in 1941. He organized both the elementary and advanced courses in industrial statistics and quality control. At present he is Professor and Head of the Industrial Engineering Division.

It should be noted that the field of statistical decision-making is relatively new, but one that is gaining support at a rapid rate. To some, the pressure of work and what seems to be an unreasonable amount of terminology combine to create the impression that too much time and effort are necessary to understand a sufficient amount of industrial statistics. But he who makes a sincere effort to learn and to use these techniques is early rewarded by finding that the basic fundamental ideas are natural, simple, and extremely useful.

General Considerations

In the term *design of experiment*, we refer to a plan of choosing a sample. For fear that the reader may think only in terms of sampling an existing process, let me hasten to assure him that many "designed experiments" are called upon, by means of planned sampling, to generate information about a process that does *not* actually exist. The objective is to discover what would be the properties of the process if the process did exist. Much of the exploratory research is carried on in an environment where the process does not exist.

Of course, a second situation exists when there is actually a real process and the objective is to determine certain measurable characteristics relative to this process. Again, there are special designed experiments which can give more complete and precise information about this process than just haphazard sampling. The analysis of the data in the designed experiment forces one to use the concepts of statistical significance and estimation which, in turn, force one to think in terms of decisions with calculated risks.

Again it should be emphasized that the philosophy of decision-making via designed experiments is basically decision-making in the face of random variability. This philosophy is fundamental to industrial statistics.

Anyone who tries to make sense out of a set of observational or experimental data is assuming the role of a statistician. However, the ability

* This paper is based on a talk given before the Northwest Section, AACC, November 21, 1958.

to scrutinize, to look beneath the surface and to discern relationships from given data, is aided by scientific methods of collecting, analyzing, and interpreting data. The modern methods of designed experiment deal with such questions as:

1. How shall a program of obtaining data be planned?
2. How shall the data be analyzed?
3. What conclusions are we entitled to draw from the data?
4. What is the experimental error and how reliable are the conclusions?

To answer completely these questions in research, engineering, or production is an impossibility, but we may gain an insight into the basic philosophy.

Planning

The main impact of question 1 is that the program of obtaining data must be *planned*. Too many times a project is started, data are obtained, and then a post-mortem is held in the faint hope of finding something "significant." The criterion of significance in this situation often depends upon personal judgment.

Before an effective program of obtaining data can be planned, we must *state the problem*. The usual reaction to this remark is that this is trivial, obvious, and trite. But don't let that stop you. The next time that you attempt to plan a project, actually list the questions that you are attempting to answer by obtaining data. If you do, perhaps after sufficient exploration, you have completed one of the most important requisites of a designed experiment. Many of the questions that you ask constitute a statement of the hypothesis under test.

The problems associated with experimental research are basically problems that demand an analysis of the variation of the data, in an attempt to determine which variables are significant and which are not. To this end, statistical methods are used to analyze the data from the designed experiment to calculate the total amount of variation, which is subdivided into categories traceable to definite sources.

The relative sizes of these key categories of variation are compared with the size of the "experimental error." The significance of the factors can be judged as an outcome of these comparisons. The sensitivity of the experiment depends upon the magnitude of this experimental error; the error becomes the yardstick of the experiment. The size of the error determines our ability to pick up effects that are significant and thereby dictates a "level of comparison." A large experimental error might very well mask the effects of important variables which are present. The ideal situation would dictate a minimum experimental error; however, we are usually forced to indicate an "economic" minimum. Our problem in planning a program for obtaining data is twofold: namely, that of estimating the experimental error, and that of determining an economic experimental error (yardstick). A preplanned experiment provides at least three ways of controlling the experimental error:

1. The degree of refinement of the measurement techniques.
2. The selection of the number of replications.
3. The choice of the *design of the experiment.*

Some Basic Designs

The *subject* of a designed experiment is the dependent measurable characteristic. Other variables which appear likely to affect the subject are called the *factors*. The relation of subject to factors can be measured by proper planning of a related set of tests with key factors controlled at a given number of planned levels.

Consider the following introductory remarks that suggest the evolution of a designed experiment which allows an unbiased estimate of the experimental error.

The problem is to test for significant differences that might exist between four wheat varieties. This hypothetical experiment is motivated by an interest in selecting that wheat variety which responds to milling by giving the greatest yield of patent flour. It is believed that the specific type of experimental mills have different milling characteristics which might affect the yield. Consider the subject of the experiment to be yield of patent flour and the factor to be wheat variety. We shall label the wheat varieties A, B, C, and D. Let us consider a very practical situation in which the four different wheat varieties are milled by four different experimental milling units, 1, 2, 3, and 4.

In this situation, to lay out the experiment as shown schematically below is obviously faulty experimental design. If a difference appears we do not know whether the difference is due to experimental mills or to wheat varieties. The mills effect is completely confounded with the varieties effect, and the two are not separable.

MILL 1	MILL 2	MILL 3	MILL 4
Variety A	Variety B	Variety C	Variety D
Variety A	Variety B	Variety C	Variety D
Variety A	Variety B	Variety C	Variety D
Variety A	Variety B	Variety C	Variety D

A suggested improvement on the above procedure is to completely randomize the wheat varieties among the experimental mills. For example, we could identify A, B, C, D four times by 16 random numbers. Each mill would process the four wheat varieties as they occurred by this "complete randomization":

MILL 1	MILL 2	MILL 3	MILL 4
Variety A	Variety B	Variety C	Variety B
Variety C	Variety A	Variety D	Variety B
Variety C	Variety D	Variety B	Variety A
Variety A	Variety C	Variety D	Variety D

This design is statistically sound. We can find the averages of the four yields of patent flour for each wheat variety to estimate their true values. However, the error of the estimates will be inflated because it includes the variability due to experimental mills. Thus the experiment is not as sensitive as it might be.

Another suggestion in the light of the above discussion might be to have each mill process each variety once:

MILL 1	MILL 2	MILL 3	MILL 4
Variety A	Variety A	Variety A	Variety A
Variety B	Variety B	Variety B	Variety B
Variety C	Variety C	Variety C	Variety C
Variety D	Variety D	Variety D	Variety D

In this situation the differences in wheat varieties are completely independent of experimental mills. However, in order not to introduce any possible bias into the experiment because of the identical ordering for each mill, a further refinement is suggested to randomize the order of varieties to be milled for each mill:

MILL 1	MILL 2	MILL 3	MILL 4
Variety A	Variety C	Variety B	Variety D
Variety C	Variety B	Variety C	Variety B
Variety D	Variety D	Variety D	Variety A
Variety B	Variety A	Variety A	Variety C

This is called a "randomized block" design and is one of the simplest and perhaps most frequently used experimental designs. A conventional notation would label experimental mills as "blocks" and wheat varieties as "treatments." The blocks are so chosen that articles in a block have some common feature or background likely to make them uniform. If possible, every article in a block receives identical handling throughout the experiment except for one factor: the experimental treatment (varieties in this example). Thus we identify this experiment as single grouping to reduce errors.

The statistical technique applicable to analyze the data obtained from the randomized block design is the "analysis of variance." By using the anaysis of variance we can divide the total variability into three "sources of variation"; namely, varieties, mills, and experimental error. Thus, variety effect can be compared with the experimental error to determine the varieties significance, regardless of whether there is a significant variation from mill to mill.

Note that the possibility for gain in sensitivity in a randomized block design arises from the grouping that is employed in the experiment. The principle is to use groupings within which the product is likely to be less variable than the product as a whole.

Features of randomized blocks:[1]

1. One category of factors can be permitted to vary from one block to another, yet the main component of this variation becomes excluded from the residual error of the experiment.
2. Any number of treatments that is desired can be used, so long as each block has the same set of treatments.
3. As many repeat tests (called "replications") as are wanted can be obtained by adding blocks.
4. Anaysis of remaining data can still be made even if some failure in process or test eliminates an entire block.

OPERATOR	MILL 1	MILL 2	MILL 3	MILL 4
I	Var. A	Var. B	Var. C	Var. D
II	Var. D	Var. A	Var. B	Var. C
III	Var. C	Var. D	Var. A	Var. B
IV	Var. B	Var. C	Var. D	Var. A

A natural extension of the concept of single grouping to reduce errors is to suggest a double grouping. For example, it is well known that the yield of patent flour can be influenced by the techniques of the operators I, II, III, and IV. By advanced planning the design with double grouping requires that each wheat variety is processed just once respectively with each experimental mill and operator combination. It follows, then, that the number of mills, varieties, and operators must all be the same. An experimental design of this type is called a Latin-square experiment. The scheme is given below.

Wheat Variety	MILL 1	MILL 2	MILL 3
A	Sample 1A	Sample 2A	Sample 3A
	Sample 1A	Sample 2A	Sample 3A
	Sample 1A	Sample 2A	Sample 3A
B	Sample 1B	Sample 2B	Sample 3B
	Sample 1B	Sample 2B	Sample 3B
	Sample 1B	Sample 2B	Sample 3B
C	Sample 1C	Sample 2C	Sample 3C
	Sample 1C	Sample 2C	Sample 3C
	Sample 1C	Sample 2C	Sample 3C
D	Sample 1D	Sample 2D	Sample 3D
	Sample 1D	Sample 2D	Sample 3D
	Sample 1D	Sample 2D	Sample 3D

As before, the observed variation in yield of patent flour can be classified. If the subject of the experiment satisfies certain basic assumptions of the analysis of variance, we can measure the significance of the three sources of variation; namely, the varieties, the mills, and the operators. The criterion of significance again is determined by comparison with the experimental error.

However, there exists a restricting assumption in the analysis of the Latin-square data. That is, this design will not measure "interaction." Interaction is basically an additional response in one factor due to the presence of another factor. The assumption of no interaction can either be tacit or explicitly determined. (Much of our classical experimentation incorrectly assumes that the factors are independent and that interaction does not exist.)

An elementary experiment which has the interaction effect designed into it is a two-factor design with repeated measurements. That is, if there is a possibility for significant interaction, the best estimate of the experimental error for use in investigating significance is obtained from measurements repeated under the same conditions. This replication will allow us to analyze the data more fully.

Suppose that in a study of yield of patent flour the two factors are wheat varieties and experimental mills, and that three samples of the same wheat variety are milled by the same experimental mill. The design takes the appearance shown in the next column.

To analyze the data of this experiment we can again use the statistical technique called the analysis of variance. We divide the source of total variation into four different categories; namely, wheat varieties, experimental mills, interaction between varieties and mills, and experimental error. Thus we have a yardstick in terms of the experimental error to determine the significance of the factors involved. At least by this designed experiment, together with its analysis, we can determine statistically significant factors in an objective manner and can determine the risks of wrong decisions. The wrong decisions are of two types; namely, the decision that there is no significant difference when the difference actually exists, or the decision that there is a significant difference when the difference does not exist.

Summary

Four questions were asked concerning scientific methods of handling data, and basic concepts ingredient in the design of the experiments were emphasized.

Until recently, the classic accepted method of experimentation has been to answer a single question about a single variable; that is, there was an attempt to control all other factors except the one of interest. However, it is often found that data based on the control of all factors except the one under investigation consists of a number of disjointed pieces of information that cannot be easily put together.

Under the method of designed experiments, plans are available which consider the investigation of the effects of a number of independent factors at the same time. The author wishes to emphasize that the desired information should be planned and designed into the experiment before the actual data are obtained.

There are several advantages gained by designed experiments which help answer the question, Why design experiments? Three important advantages may be summarized as follows:

1. Greater efficiency—therefore greater economy of experimentation;

(Please turn to page 103)

[1]See *Quality Control Handbook*, J. M. Juran, McGraw-Hill Book Co., Inc., 1951.

GLUCONO-DELTA-LACTONE*

CHARLES FELDBERG, Technical Service Department, Chas. Pfizer & Co., Inc., Brooklyn, New York

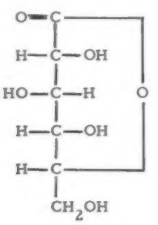
GLUCONO-DELTA-LACTONE HAS BEEN available commercially to the food industry for over 20 years. In 1933 it was accepted as a safe, nontoxic food-grade chemical by the Committee on Foods of the American Medical Association(1). However, until recently its use in foods has been limited to specific small-quantity usage in such products as bland-flavored sherbets, and to reduce fat absorption in rolled waffle cones and doughnuts.

At present the U.S. Armed Forces at the Quartermaster Food and Container Institute in Chicago are engaged in a developmental program to provide a chemically leavened bread mix which will produce bread without the conventional yeast fermentation and proofing steps. The acidulant of choice in the chemical-leavening system of this "instant" bread mix is glucono-delta-lactone. Published reports of this work have created new interest in this acidulant, not only for the "instant" bread mix, but in many other baked products.

In this discussion the properties of glucono-delta-lactone (GDL) which make it an excellent acidulant for baked products utilizing a chemical leavening action will be outlined. Also, some of the products in which GDL may be used will be discussed.

Properties

Glucono-delta-lactone is an inner ester of gluconic acid. It is marketed as a white crystalline powder with an initial sweet taste and a slight acidic after-taste. One part of GDL will completely neutralize 0.472 parts of sodium bicarbonate, liberating 146 ml. of carbon dioxide. The physical properties of GDL are given in Fig. 1.



Glucono-delta-lactone

Formula:	$C_6H_{10}O_6$
Molecular Weight:	178.14
Melting Point:	153° C.
Specific Rotation:	+61.7°
Solubility	
Water at 20° C. (68° F.)	59 gm./100 ml. (reacts to form gluconic acid)
Alcohol	1.0 gm./100 ml.
Ether	Insoluble

Fig. 1. Physical constants of glucono-delta-lactone.

Although GDL is not an acid, in water solution it slowly hydrolyzes to an equilibrium mixture of gluconic acid and its delta- and gamma-lactones. When hydrolysis is complete, the solution contains 55 to 60% gluconic acid and 40 to 45% lactones, based on the amount of added GDL. The hydrolysis rate is increased with an increase in temperature. Figure 2 shows the hydrolysis rate as affected by the strength of the solution. As is indicated, the hydrolysis rate increases sharply with an increase in solution strength.

A 0.75% aqueous solution of GDL at 25°C. has an equilibrium pH of 2.5 to 2.7; citric acid solution of the same concentration has a pH of 2.3. On neutralization with an alkali, such as sodium bicarbonate, the equilibrium is upset and all the lactone is converted to the acid.

The slow hydrolysis rate of GDL in cold water, and its acceleration with an increase in temperature, make it an excellent acidulant for bakery products which utilize a chemical raising action. Figure 3 shows the carbon dioxide evolution at various temperatures when GDL is the acidulant in baking powder, as measured on a modified Chittick apparatus. Experiments showed that GDL coated with 10% calcium stearate reduced the rate of acid release by 25%, as compared with uncoated GDL. Figure 4 shows the carbon dioxide evaluation at various temperatures when GDL coated with 10% calcium stearate was the acidulant in baking powders, as measured on a modified Chittick apparatus. This coating is particularly effective at the lower temperatures. When the moisture pick-up of the other ingredients in a dry bakery mix may present a problem, this calcium stearate coating acts to improve the stability of glucono-delta-lactone. This is a physical coating of calcium stearate on the glucono-delta-lactone, produced by blending the two dry ingredients.[1]

Applications in Cakes

Because of the slow hydrolysis rate of glucono-delta-lactone in cold water, little acid is formed during cake batter preparation, with a resulting small loss of carbon dioxide in this stage. The main release of carbon dioxide occurs at the elevated temperatures of the baking cycle, which is the ideal time. Also, since the acid is formed at a controlled, even rate, the carbon dioxide is evolved at an even rate, producing a texture in the baked product of small, even air spaces. Glucono-delta-lactone as the acidulant in cake batter reduces to a minimum the possibility of forming large, uneven air sacs. In certain cakes best results are obtained when GDL is used with another chemical acidulant. Generally, use of GDL as 50 to 70% of the total acid source produces optimum results.

* Presented at Midwest Section, AACC, Chicago, Jan. 5, 1959.

[1] Canadian Patent No. 563,621, September 23, 1958.

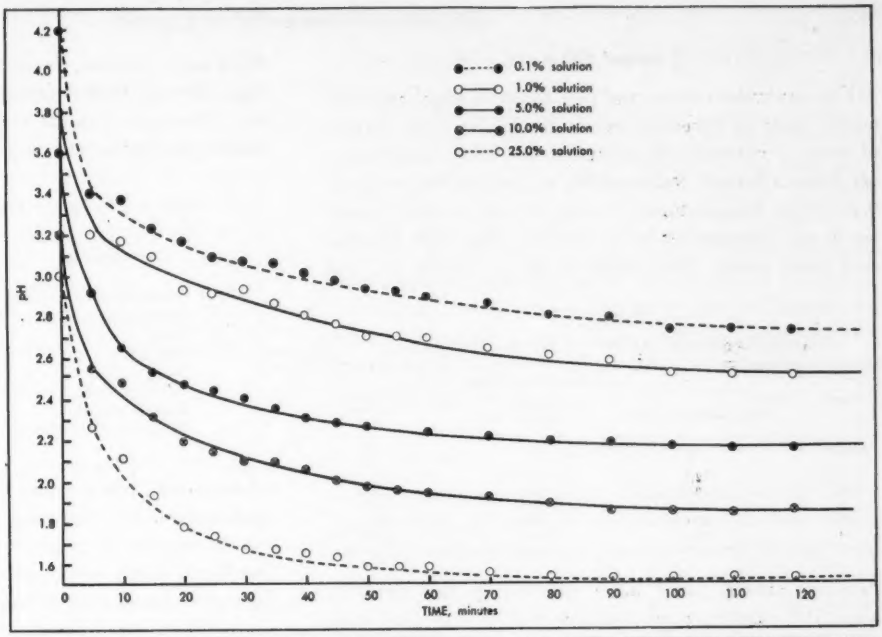


Fig. 2. Hydrolysis rate of glucono-delta-lactone at 25°C.; pH variation with time at various solution strengths.

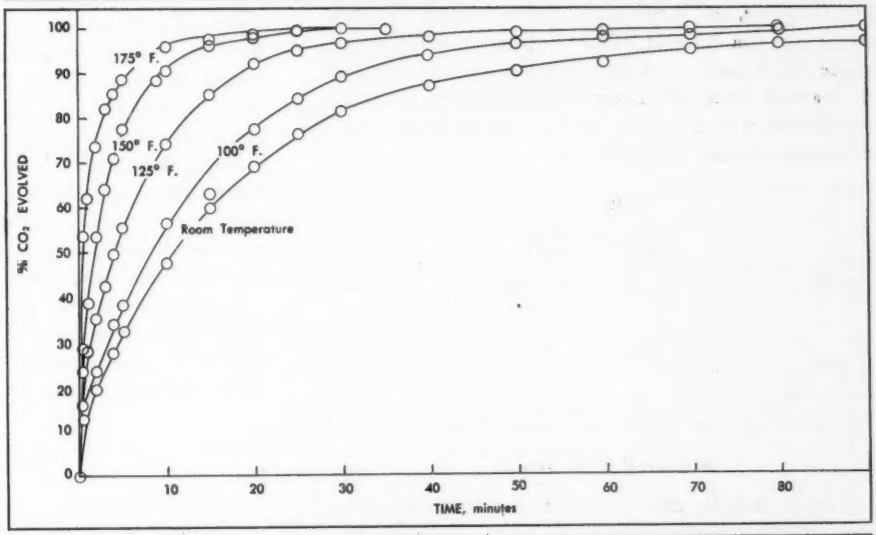


Fig. 3. Carbon dioxide evolution at various temperatures when glucano-delta-lactone is used as the acidulant in baking powders; modified Chittick apparatus used.

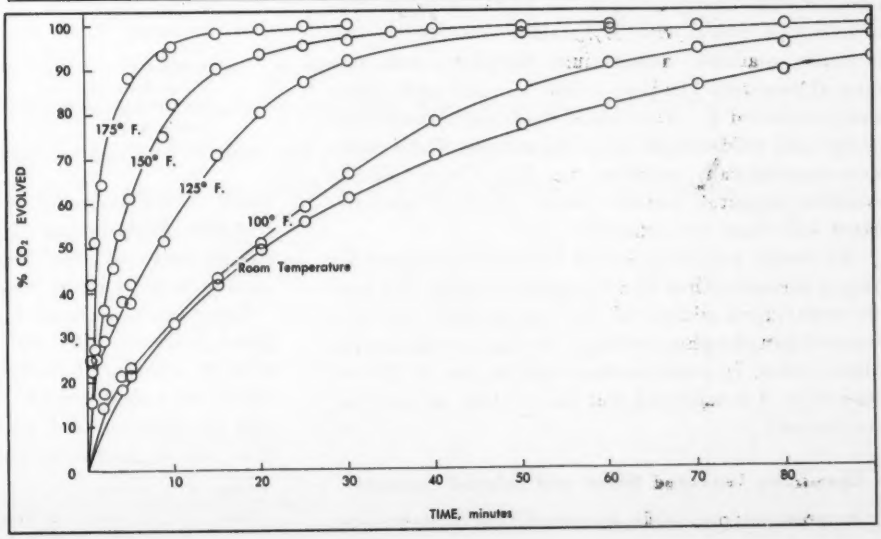


Fig. 4. Carbon dioxide evolution at various temperatures when glucono-delta-lactone, coated with 10% calcium stearate, is used as the acidulant in baking powders; modified Chittick apparatus used.

Angel Cake

For maximum volume and best flavor in angel cake, the acidity must be developed late in the baking cycle. Cream of tartar is currently the acidulant of choice in this product, since it is more water-soluble at elevated temperatures than at low temperatures. Carbon dioxide evolution studies in our laboratories have indicated that GDL releases acid more slowly than cream of tartar (Table I), and

TABLE I
CARBON DIOXIDE EVOLUTION AT ROOM TEMPERATURE

TIME	AVAILABLE CARBON DIOXIDE		
	Glucono-Delta-Lactone	Cream of Tartar	Tartaric Acid
minutes	%	%	%
0.5	12.7	53.7	87.2
2	19.5	80.0	94.5
5	32.3	92.0	97.8
20	69.0	99.4	99.2
60	92.4	100.0	100.0

therefore should prove more effective in this product. Also, GDL contains more available acid on a percent basis and, therefore, less is needed. A typical formula for angel cake is given in Table II. Since one part of GDL will neutralize 0.472 parts of sodium bicarbonate and one part of cream of tartar will neutralize 0.447 parts of sodium bicarbonate, 0.43 lb. of GDL will replace the cream of tartar in this formula (Table II).

TABLE II
ANGEL-FOOD CAKE
(Typical Formula)

INGREDIENT	FORMULA	FLOUR BASIS	BATTER BASIS
	lb	%	%
Flour	10.00	100.0	14.50
Sugar	29.10	291.0	42.10
Egg whites	29.10	291.0	42.10
Salt	0.45	4.5	0.65
Cream of tartar[a]	0.45	4.5	0.65

[a] Glucono-delta-lactone (0.43 lb.) will replace the cream of tartar.

Prepared Cake Mixes

A 1-year stability study was made in our laboratory on prepared cake mixes, using as the acid sources glucono-delta-lactone coated with 10% calcium stearate, a commercially available monocalcium phosphate, and mixtures of these two. The basic yellow cake mix used in this study contained a 1.2:1.0 sugar-flour ratio, shortening, nonfat milk solids, whole egg solids and salt. The samples were systematically evaluated for their carbon dioxide evolution properties, and the specific volume of cakes prepared with them was estimated.

The sample containing coated GDL only produced the highest average carbon dioxide evolution rating. The sample containing a mixture of 70% coated GDL and 30% monocalcium phosphate produced the best average specific volume cakes. In experimenting with the use of GDL in cake mixes it is suggested that this mixture, or a similar one, be used.

Chemically Leavened Bread and Related Products

As mentioned previously, personnel at the Quartermaster Food and Container Institute for the Armed Forces, Chicago, Illinois, have developed a chemically leavened bread mix. The basic formula for this mix, adapted from Matz, Miller, and Davis (2) is given below. The current status

Basic Bread Formula

Ingredients	*Percent of Flour Weight*
Bread flour	100.0
Shortening	5.0
Salt	1.0
Sucrose	5.5
Soda	3.5
Glucono-delta-lactone	9.0
Nonfat dry milk	6.0
Water	55.0 (varies)

of this work indicates that the use of glucono-delta-lactone and sodium bicarbonate provides a chemical leavening system capable of producing a baked loaf of bread quite similar in shape, color, grain, and texture to that produced by conventional yeast fermentation.[2] Moreover, this bread is devoid of the objectionable after-tastes of residual leavening salts. An experimental flavor component has been developed which, when added to this mix, imparts a desirable flavor which is somewhat characteristic of a yeast-leavened bread.[2,3] As yet, a suitable dry flavor component is not commercially available.

Using this same basic mix with slight modifications Matz, Miller, and Davis (2) have reported on the production of a variety of baked products including cinnamon bread, sesame egg twist, wheat bread, raisin bread, streussel coffee cake, pizza dough, and hot rolls.

In our laboratories we have produced a variety of baked goods using GDL as the acid source in the leavening system. With the basic formula for hot rolls given below, it has been determined that the amount of GDL

Hot Roll Formula

Ingredient	*Percent of Flour Weight*
Bread flour	100.00
Shortening	12.00
Salt	2.00
Dextrose	10.00
Nonfat dry milk	4.00
Glucono-delta-lactone	4.24 (may vary)
Soda, granular	2.00 (may vary)
Water	62.00 (varies)

based on the weight of flour can be reduced from 9% to 4.24%. With the latter level of GDL, 2.0% of granular baking soda was used. The use of dextrose in place of sucrose in the formula resulted in improved crust color.

Using the basic bread formula (above), we have prepared acceptable filled coffee rings. The dough is mixed with the addition of alcohol extract of vanilla. It is then rolled into a sheet, spread with butter, raisins, and a mixture of cinnamon and sugar, and formed into a ring. This ring is proofed for 5 minutes at room temperature

[2] Miller, J. A., McWilliams, C. S., and Matz, S. A. Paper presented at 43rd annual meeting, Cincinnati, Ohio, April 1958.
[3] Davis, J. A., and Matz, S. A. Paper presented at 43rd annual meeting, Cincinnati, Ohio, April 1958.

and baked for approximately 25 minutes at 375°F. The finished coffee ring is then covered with a glaze of milk, butter, and confectioner's sugar.

We have also investigated other forms of glucono-delta-lactone in the chemically leavened bread mix. It has been initially determined that the use of specially milled GDL, coated with 10% calcium stearate, seems to produce better loaf volumes than when the conventional forms of GDL are used. Since these experiments have been quite limited in nature, it is as yet uncertain which of these forms of GDL or which levels of coating should be recommended.

Refrigerated and Frozen Doughs

The conversion of glucono-delta-lactone into the acid is substantially inhibited at refrigeration temperatures and below. Because of this property, GDL is an excellent source of acid in leavening systems for refrigerated and frozen doughs.

Biscuit Formula

Ingredient	*% by Weight*
Flour	52.25
Buttermilk	34.00
Shortening	9.00
Sugar	0.50
Salt	1.40
Sodium bicarbonate	1.20
Glucono-delta-lactone	1.65

A formula for refrigerated biscuits is given above.

Preliminary experiments indicate that acceptable frozen rolls can be produced without thawing or proofing prior to baking, using GDL and sodium bicarbonate as leavenings. In this product the dough is first fermented by the conventional yeast system to produce a typical roll flavor. The chemical leavening system is mixed into the dough. This dough is then formed into the desired roll shapes and frozen. When the frozen dough is to be made up, it is placed directly into the oven and baked without prior thawing or proofing.

Summary

The properties of glucono-delta-lactone which make it an excellent acidulant in those bakery products using a chemical raising action have been discussed. Formulas for various baked products which have been successfully prepared on a laboratory scale using a GDL and sodium bicarbonate leavening system are also discussed. They are presented not as final formulas but as suggested starting points for further investigation. To the experienced investigator the unusual properties of GDL will suggest further areas worthy of study.

WANTED

Your ideas for revisions, omissions, and additions that would improve **Cereal Laboratory Methods.** The Revisions Committee is planning the Seventh Edition NOW. Technical committees are reviewing and testing methods. Your suggestions are earnestly desired. Please send them as soon as possible to M. M. MacMasters, 1815 N. University St., Peoria, Illinois.

Washington, D. C. provides an appropriate backdrop for the largest and most diversified technical program ever offered by the AACC, on the occasion of its

44th Annual Meeting

WASHINGTON, D.C., WILL provide an appropriate setting for what promises to be the most diversified and practical technical program ever presented before the American Association of Cereal Chemists. Host to the meeting, which is being held May 3–7 at the conveniently situated Statler Hotel, is the Chesapeake Section. General chairman for local arrangements is Kenton L. Harris of the U.S. Food and Drug Administration in Washington. Program chairman is Frank E. Horan of Hercules Powder Co., Wilmington, Delaware.

Frank E. Horan

Dr. Horan reports splendid response and cooperation from the many well-known cereal scientists participating in the program. The numerous papers and discussions will follow a definitely practical line, allowing abundant opportunity for each person attending the meeting to benefit in a practical way.

The Theme: Diversification

AACC President Clinton L. Brooke of Merck & Co., Inc., Rahway, New Jersey, and Dr. Horan have exerted every effort to make sure that this year's technical program adheres to its theme: diversification. Success for their efforts is evident in the titles of the various sessions, which signify something of real interest to all members: baking and bakery products; the Food and Drug Administration and cereal chemistry; practical aspects of grain and cereal testing; grain structures and grain constituents; the wet-milling industry; cereals in foods; chemicals from cereals by microorganisms; grain sanitation; grain drying; grain and dry-milling technology; cereals in feeds.

Opening Session

In his presidential address, Mr. Brooke will reveal more of the Association's specific efforts to encourage and build active participation by all categories of the steadily expanding membership. He will point the way to a future program dedicated to secure full benefits for the entire cereal industry and the public it serves.

Mr. Brooke has been associated with the milling and baking industry for his entire professional life. His graduate work at the University of Minnesota was preceded by work as chemist in Uppsala, Sweden, and services as translator at the Swedish Institute of Race Biology, Uppsala. Before joining Merck & Co. he was associated with such American companies as The Pillsbury Co. and National Yeast Corporation. He served as AACC national secretary from 1953 to 1957, and became president-elect in 1958.

Launching the opening session, George W. Irving, Jr., will discuss cereal chemistry and Government research, with a look ahead to some of the projects shaping up in USDA research laboratories. Dr. Irving is in a key position in this program; he is deputy administrator, Agricultural Research Service, in charge of and directly responsible for the activities of the four utilization research and development divisions of the USDA.

A great deal of the Government's effort to encourage better utilization of the nation's huge production and still greater potential is directed toward the cereal industry. The greatest challenge is in corn, wheat, and grain sorghum; a carry-over into 1959–60 of more than 100 million tons of these grains is forecast.

Solutions to many of the knottiest problems facing the industry in past years have sprung from the utilization research laboratories, which coordinate the producer and the cereal industries. Dr. Irving's discussion of objectives his research teams have set, to establish new goals on the road to research in cereals, should further this commendable trend toward co-

Kenton Harris gets snarled in local arrangements tape — but comes through in fine style.

ordination. He will explain how, in planning research, the Department works by way of conferences with commodity research advisory committees representing growers, processors, and distributors. The primary objective of this program is the discovery of new concepts and ideas that can be translated into commercially practicable new products, new uses, and improved processing.

Following Irving will be Dr. Arnold E. Schaefer, Executive Director, Interdepartmental Committee on Nutrition for National Defense. Dr. Schaefer's responsibility is the nutrition and diet of the armed forces of our friends overseas. He will describe some of his experiences and discuss the general nutrition of these troops.

Symposium

Appropriately, what promises to be a brilliant highlight of the program will follow the opening session: a symposium dealing with current trends in fundamental research as related to cereal chemistry. Five of the nation's best-known authorities on nutrition and cereal chemistry will participate, with Robert B. Koch presiding.

A. L. Elder and T. J. Schoch of Corn Products Co. will report on fundamental studies undertaken to evaluate important physical properties of starches, relating these qualities to various applications. The Association is honored to have Dr. Elder, as president-elect of the American Chemical Society, address the meeting.

Robert Glass, University of Minnesota, will discuss the complicated picture and conflicting results of research on the role of lipids in baking.

H. O. Halverson, University of Wisconsin, will present the current status of knowledge of the mechanism for modifying enzymatic patterns of yeast and bacteria.

Edwin T. Mertz, Purdue University, will talk about new techniques of fractionation and identification of proteins, including labeling of isotopes, in relation to current and future research on cereal proteins.

Finally, Charles G. King, executive director of The Nutrition Foundation in New York, who is an eminent world authority on nutrition, will sum up the current trends in "Lipid, protein, and related nutrition research." Dr. King will describe the effects on children and adults of protein and lipid intake, with comments on complex interrelationships with other nutrients. He will also discuss current problems of major interest in food biology and health. This should be a worthwhile and challenging symposium.

Albert L. Elder chose the University of Illinois for all his higher education, receiving the A.B., M.S., and Ph.D. degrees there, the latter in 1928. The next two years were spent teaching at Oberlin College, where he held the Charles M. Hall Research Fellowship. Then he went to Syracuse University as professor of chemistry and taught there for 11 years.

That brought the calendar around to 1941, and Dr. Elder was called to Washington to serve on the War Production Board. He was closely associated with early developments of the synthetic rubber program and with labor problems in the chemical industry; was head chemical advisor and coordinator of the penicillin program until 1944. He left to become director of research of Corn Products Company, whose facilities are centralized in the George M. Moffett Research Laboratories at Argo, Illinois.

Dr. Elder has served his profession in so many ways and on so many occasions that his selection in 1958 as president-elect of the American Chemical Society seems a very natural outcome. The University of Illinois Alumni Association, the National Research Council, Research and Development Associates Food and Container Institute, and the ACS itself in previous capacities have all had the benefit of his vast experience.

Charles Glen King comes from the genuine Far West — born in Entiat, a small town on the Columbia River at about the geographical center of Washington State. But these surroundings were not such as to hold a man of his ability and destiny. Graduation from Washington State College in 1918 with the B.S. degree in chemistry, minors biology and geology, was the first step toward a distinguished career growing out of the first two of these sciences. Both M.S. and Ph. D. degrees were soon earned at the University of Pittsburgh. Postdoctorate studies at Columbia University and at Cambridge University, England, were milestones leading to the position he has held since 1946 — professor of chemistry at Columbia.

Beyond this, Dr. King is an eminent authority in nutrition and has traveled widely in its interests. He serves as special consultant to national departments and services such as the surgeon generals of the Public Health Service and the Army; UNICEF; PHS council on arthritis and metabolic diseases. Since 1942 he has served The Nutrition Foundation, Inc., first as Scientific Director and, from 1955, Executive Director.

If scientific awards and memberships in learned societies were worn like military ribbons, Dr. King's would be a multiple rainbow. The awards alone are impressive: Pennsylvania Public Health Association; Pittsburgh Award, ACS; Scientific Award, Grocery Manufacturers of America; the John Scott and, most recently, the Nicholas Appert award.

In Robert L. Glass' undergraduate interests at the University of Illinois, chemistry was predominant and his B.S. degree, received in 1950, carried a major in the subject. He moved in the direction of his present specialization with graduate work in nutrition in the department of agricultural biochemistry, University of Minnesota, and received his M.S. degree there in 1954 and Ph.D. in 1956. Since then he has been a staff member in the same department as assistant professor, working in the cereal section.

Dr. Glass has two main research interests: lipids as they pertain to the baking quality and storage stability of wheat; and the problems of grain storage, particularly the metabolism

of moist grain when stored in inert atmospheres. He has recently contributed to the long series of articles by various authors under the general title "Grain storage studies," published mainly in CEREAL CHEMISTRY.

Edwin T. Mertz is a Montana product, hailing from Missoula. His primary and secondary schooling was there, and his B.A. degree was won at the University of Montana in 1931, in chemistry and mathematics. Graduate work in biochemistry under W. C. Rose at the University of Illinois was the next phase of his career, carrying him to the M.S. degree in 1933 and the Ph.D. in 1935.

During the decade following graduation, Dr. Mertz's experience and locations were varied. They included successive positions as biochemist with Armour & Co.; instructor at several universities — Illinois, Iowa, and Missouri; and chemist at Hercules Experiment Station, Wilmington, Del.

In 1946 Dr. Mertz joined the biochemistry staff at Purdue University, where he now holds the rank of professor. He is also consultant in biochemistry to the Indiana State Schools and research adviser to the Western Fish Nutrition Laboratory, USFWS, Cook, Washington. His deep interest in amino acid and protein chemistry and nutrition is manifested by many publications.

Harlyn O. Halvorson is a native of Minneapolis, Minnesota, and he stayed around those parts quite a while. He had finished at Breck School in St. Paul and entered the University of Minnesota by 1943, but took time out then to serve in the Navy Air Corps for three years, picking up credits at various colleges during that time. Then he returned to the University and received the degree B.S. *cum laude* in 1948, in chemistry and chemical engineering. He went right on at Minnesota, stepping over to St. Paul again to major in biochemistry on the University's Ag Campus, and got the M.S. degree a year later in studies on the reproduction and lactation of rats fed plant rations. At the University of Illinois, with major in bacteriology and minor in chemical-physical biology, he received his Ph.D. degree in 1952. Here his work was on the precursor in the induced synthesis of enzymes.

Dr. Halvorson's teaching career began immediately at the department of bacteriology, University of Michigan, first as instructor and then as assistant professor. A year of study opened up for him as Merck Senior Postdoctoral Fellow at the Pasteur Institute, Paris. Then in 1956 Associate Professor Halvorson joined the bacteriology staff at the University of Wisconsin, where he remains and follows his research interests: induced synthesis of carbohydrases in yeast; nucleic acid and protein biosynthesis in yeast; dormancy and germination of bacterial endospores.

Technical Sessions

The sessions following the symposium should prove no less stimulating. James M. Doty of Doty Laboratories will preside over a Wednesday morning session on the practical aspects of grain and cereal testing. Under Jim's capable guidance this session will be popular with all those interested in learning new techniques and solving everyday laboratory problems. On the agenda is "A review of methods of measuring wheat gluten quality" by Frederick D. Schmalz of King Midas Flour Mills. Two more papers of practical significance, presented by members of the Grain Research Laboratory in Winnipeg, are: "Methods of evaluating flour strength" by G. N. Irvine and "Intercomparison of farinograph absorption obtained with different instruments and bowls" by I. Hlynka.

General Mills' P. E. Ramstad will present a paper by Wintermantel, New, and Ramstad: "Stability tests on cereal products by the Oxygen Bomb Method"; and for The Pillsbury Company, J. L. Croteau will offer "A simple procedure for determination of flour particle size by air separation."

Two useful papers are scheduled by past president Lawrence Zeleny of the USDA and R. M. Sandstedt of the University of Nebraska. Dr. Zeleny's extends the usefulness of sedimentation value as an index of mixing tolerance in early-generation wheat selections; Dr. Sandstedt's introduces a method for the determination of percent starch damage in flour.

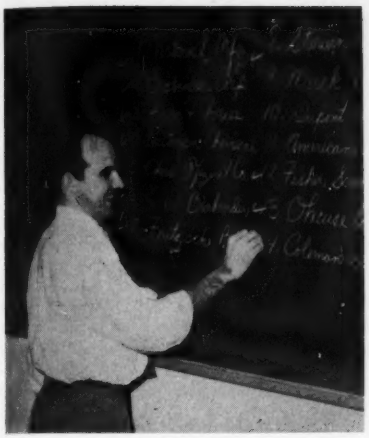
Featured at the meeting will be a session dealing with cereals in feeds, presided over by H. E. Bechtel, director of feed research, General Mills Inc. Several papers are already scheduled: "Sampling techniques and suggestions for better feed quality control" — A. B. Poundstone; "Statistical quality control applied to everyday feed manufacturing operations" — Walter A. Glista; "Influence of pelleting operations on microingredients in manufactured feeds" — Robert C. Wornick.

Panalee Ikari demonstrates, symbolically, how the AACC will jump into the national news.

An interesting session correlates the Food and Drug Administration and cereal chemistry, with V. E. Munsey of the FDA presiding. An important and timely paper by Arnold J. Lehman will discuss the adequacy of food-additives toxicity studies. Also contributing will be Franklin D. Clark on field applications of the FD&C Act, and Edwin P. Laug on radioactive contamination of grain and grain products.

Donald K. Dubois, Huron Milling Division of Hercules Powder Co., will lead the session on baking and bakery products. More than a dozen useful papers are being given by well-known cereal chemists on a variety of subjects in this category.

It is expected, though not yet confirmed, that several distinguished foreign cereal chemists will attend and present papers; I. T. Rada of Hungary, Senor Quintari-Mari of the Laboratory of Cereal Investigations,



O'Dean Kurtz lists companies who will exhibit scientific equipment at the meeting.

Barcelona, Spain, and Dr. Holger-Jørgensen of Dansk Gaerings-Industri Ltd., Copenhagen, Denmark.

A session on grain and dry-milling technology under the capable direction of H. H. Schopmeyer, director of research at International Mills, underlines the Association's interest in cereals other than wheat. Handling the discussion on the various cereals are Dr. Schopmeyer, rye; S. F. Brockington of Quaker Oats Laboratories, oats; Eric Kneen, Kurth Malting Co., barley; Robert Mickus of the Rice Growers' Association of California, rice; and R. L. Terrill, soybeans.

Majel M. MacMasters, Northern Utilization Research and Development Division, Peoria, Ill., presides over the first of several sessions on grain. She will develop the discussion on grain structure and grain constitu-

Maryvee Yakowitz, all set for ladies' registration. The more the merrier, she says.

ents. Following will be "The wet-milling industry" with John T. Goodwin, Jr., technical director, Corn Industries Research Foundation, presiding; "Grain sanitation," guided by W. H. Schoenherr; and "Grain drying" with J. A. Shellenberger of Kansas State College in charge, rounding out this series of nearly 20 papers dealing with grains.

The theme of diversification is emphasized by the two sessions on "Cereals in foods" and "Chemicals from cereals by microorganisms." The first, led by R. A. Larsen of The Pillsbury Co., will include four papers of practical value. John R. Matchett will preside over a session reporting on such subjects as microbial polymers, fermentation acids, vitamins, and antibiotics.

These, then, are a few of the highlights of this fine technical program. Together with the many other contributions from leading cereal chemists, they assure the complete success of the 44th Annual Meeting.

Lyn Pankey makes arrangements for food, frivolity, and favors at the Annual Banquet.

Marie Pankey, planner of ladies' tours, checks to be sure the Tidal Basin is tidy and the Washington Monument perpendicular.

Social Activities

As already reported, plans are being made to take full advantage of the locale of this year's meeting in the Capital City. The traditional social events will be augmented by a program designed to stimulate participation by everyone in other activities. It's a rare opportunity for you members and your families to combine attendance at the meetings with a special brand of sightseeing—the planned tours, or jaunts of your own choice, or both, in and around the nation's capital.

Design

(Continued from page 95)

2. Results can be obtained which apply over a greater range of conditions; and
3. Main effects, together with their interactions, can be estimated.

The inferences drawn from designed experiments are valid inferences, containing a measure of uncertainty. However, these inferences are rigorous when made by statistical analysis, since they include a probability measure of the amount of uncertainty involved. This circumstance makes it possible to determine the reliability of the process of acquiring new knowedge by observation.

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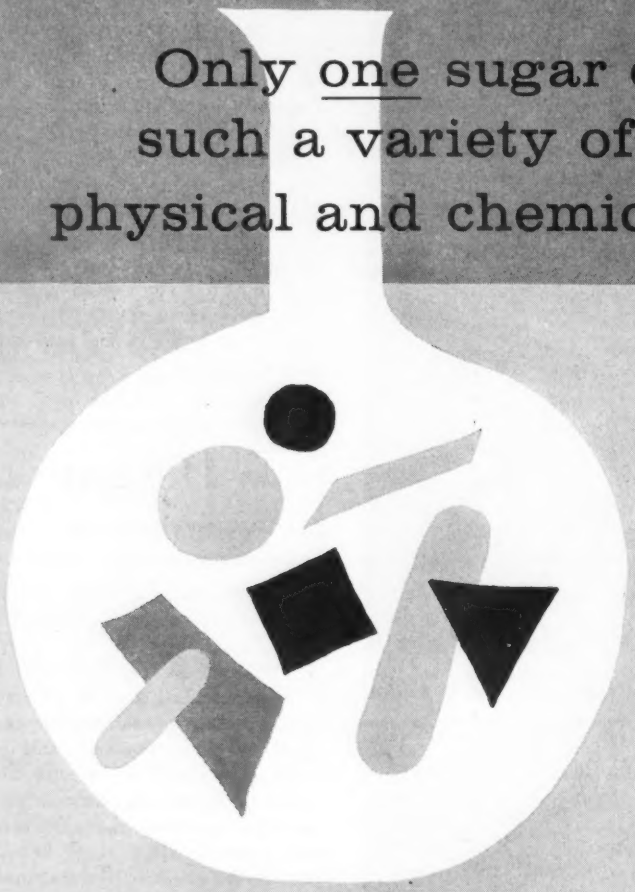

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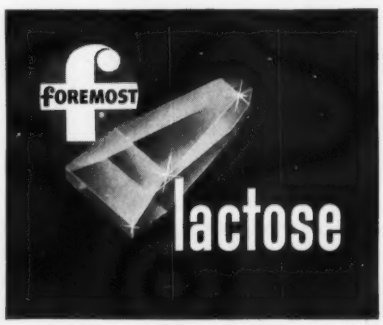

American Association of Cereal Chemists

OFFICIAL REPORTS FOR 1958

ANNUAL REPORT OF THE TREASURER, 1958

The annual financial report of the Association is herewith presented. The deficit spending evident in 1957 is still noted. Our 1958 decrease in assets is $5,950.21. The major part of this decrease is in the field of publications. CEREAL SCIENCE TODAY has not as yet reached a break-even point, but the prospects for the coming year are encouraging.

Our membership growth for the past year was somewhat below usual. We now have 1,094 active members, 55 sustaining, and 65 corporate members, which does not show a substantial gain over 1957.

It is quite apparent from our financial statement that the cost of running our organization has increased beyond our income. The full impact of the dues increase will not reflect itself until the middle or end of 1959. This increase, in addition to other changes voted on by the Board of Directors, greatly improves the outlook for the coming year.

Respectfully submitted,
MARJORIE A. HOWE, *Treasurer*

Results of Operations, 1958

Income:		
Memberships	$13,146.00	
Subscriptions	12,368.78	
Advertising (gross after agency discount)	12,126.71	
Reprints	2,431.90	
Back issues	1,204.64	
Transactions	61.83	
Interest	462.52	
Annual meeting, surplus and reimbursement	6,427.47	
ASBC income	152.00	
Miscellaneous, AACC	none	
Miscellaneous, publications	281.66	
Monograph, Vol. I	26.33	
Monograph, Vol. II	1,460.53	
Decennial Index	119.00	
Cereal Laboratory Methods	2,063.43	
Total		$52,332.80
Expenses:		
Printing and engraving	$22,131.02	
Reprints	2,102.01	
Publication envelopes	645.40	
Salaries	17,640.24	
Office supplies	2,232.70	
Postage	2,383.85	
Advertising representative's commission	3,041.36	
CST promotion	503.16	
FICA payments	227.35	
FICA accounts payable	45.57	
Membership directory	242.50	
Annual meetings	2,435.38	
Cereal Lab Methods	6.82	
Depreciation	264.30	
Bad debts and discounts	119.82	
Decennial index	100.00	
Miscellaneous, AACC	1,208.67	
Miscellaneous, publications	1,236.24	
Total		56,566.39
Decrease in surplus		4,233.59
Association assets, December 31, 1957		$22,073.19
Decrease in surplus (1958)	$4,233.59	
Reduction in Monograph inventory, 142 books sold at $4.70	667.40	
Reduction in *CLM* inventory, 201 books sold at $5.22	1,049.22	
Decrease in assets		5,950.21
Association assets, December 31, 1958		$16,122.98

Distribution of Surplus to Activities
1958 Books

Publications:			
Assets, December 31, 1957		$ 4,705.50	
Income, 1958	$38,135.52		
Expenses, 1958	45,650.54		
Operating deficit		7,515.02	
Assets, December 31, 1958 (red)			$ 2,809.52
Association:			
Assets, December 31, 1957		$ 6,261.28	
Income, 1958	10,527.99		
Expenses, 1958	10,809.96		
Operating deficit		281.97	
Assets, December 31, 1958			5,979.31
Monograph: Vol I			
Assets, December 31, 1957		829.48	
Income, 1958		26.33	
Assets, December 31, 1958			855.81
Monograph: Vol. II			
Assets, December 31, 1957		1,266.26	
Income, 1958	1,460.53		
Expenses, 1958	28.45		
Operating surplus		1,432.08	
Inventory, Dec. 31, 1957 (337 books at $4.70)	1,583.90		
Inventory, Dec. 31, 1958 (195 books at $4.70)	916.50		
Decrease in assets—reduction in inventory		667.40	
Assets, December 31, 1958			2,030.94
Decennial Index:			
Assets, December 31, 1957		548.07	
Income, 1958	19.00		
Allocation	100.00		
		119.00	
Assets, December 31, 1958			667.07
Cereal Laboratory Methods:			
Assets, December 31, 1957		8,462.60	
Income, 1958	2,063.43		
Expenses, 1958	77.44		
Operating surplus		1,985.99	
Inventory, Dec. 31, 1957 (767 books at $5.22)	4,003.74		
Inventory, Dec. 31, 1958 (566 books at $5.22)	2,954.52		
Reduction in inventory—decrease in assets		1,049.22	
Assets, December 31, 1958			9,399.37
Total assets, December 31, 1958			$16,122.98

Assets and Liabilties, December 31, 1958

Cash on hand:		
Checking account	$14,212.44	
Savings account	473.10	
Petty cash	523.17	
		$15,208.71
Current liabilities:		
Balance due on WHT and FICA taxes	245.78	
FICA taxes — accounts payable	45.57	
Dues received	13,287.00	
Subscriptions received	7,675.48	
		21,253.83
Cash position (red)		6,045.12
Assets:		
Accounts receivable (1957)	47.30	
Accounts receivable (1958)	1,971.04	
Series G bonds	4,000.00	
Series F bonds	9,900.00	
Equipment	2,378.74	
Monograph inventory	916.50	
Cereal Lab Methods inventory	2,954.52	
		22,168.10
Association assets, December 31, 1958		$16,122.98

I have examined the attached statement of financial position of the American Association of Cereal Chemists as of December 31, 1958, and the related statements of operations and surplus for the year then ended. The examination was made in accordance with generally accepted auditing standards.

In my opinion the attached statements are substantially accurate and present fairly the position of the Association as of December 31, 1958. The safeguarding of Association assets, including proper maintenance of accounting controls, is considered adequate.

JOHN D. POWELL
Accountant

Audit for the Cincinnati Meeting

We have carefully examined the expenditures, receipts, and payments made by the 1958 Local Arrangements Committee. The financial report made by that committee and presented to the Board of Directors appears to be correct.

GEORGE GARNATZ, *Chairman*
N. H. VOLLE

Report of the Board of Directors

An all-day meeting took place on January 26 at the Leamington Hotel in Minneapolis. This was the first winter meeting of the Board held away from Chicago in over 20 years. First order of business was approval of several decisions of the Executive Committee made between regular meetings. Most important of these was the change in Annual Meeting location for the year 1962. Originally this had been scheduled for Kansas City. However, since 1965 will mark the AACC's 50th anniversary, the Kansas City Section requested a change in dates so that they might celebrate the association's founding in Kansas City. The 1962 meeting will be in St. Louis, May 20-24.

Technical committee affairs were reviewed and plans discussed for the next revision of *Cereal Laboratory Methods*. The Board gave approval to the Revision Committee's recommendation that the next edition be in loose-leaf form and that regular supplements be issued to keep the book up to date.

The Monograph Committee reported excellent progress and the Treasurer indicated financial arrangements were under consideration.

Interim subcommittees within the Board have been appointed to provide detail and continuing study in vital areas such a finance, publications, etc.

CLINTON L. BROOKE, *Chairman*

Report of the Editor of CEREAL CHEMISTRY

The six issues of CEREAL CHEMISTRY published in 1958 (Vol. 35) contained 502 pages, comprising 52 research papers. The 1957 issue consisted of 478 pages which contained 51 research papers and one Communication to the Editor.

A total of 99 manuscripts were received in 1958; of these, 13 have been published and 26 have been accepted and are awaiting publication. Five manuscripts have been withdrawn and two transferred to CEREAL SCIENCE TODAY.

There is a larger backlog of manuscripts on hand than has been the case for several years, and a larger volume will be published in 1959 if funds are available. In fact, so many manuscripts are being received that the rule giving priority to papers presented at the last annual meeting and to those submitted by members is being applied. Nonmembers who have submitted papers are being advised of this long-standing rule.

The time which elapses between the date of the first submission of manuscripts and final acceptance varies widely. In some instances manuscripts require little or no revision and the authors return their revised manuscripts promptly; in others, several months elapse before the revised manuscript is received. Therefore, it will be future policy to publish the manuscripts in order of the date of their acceptance rather than receipt.

Under the rotation scheme established in 1954, two of the eight members of the Editorial Board retire each year. W. B. Bradley and I. Hlynka completed their tenure in December 1958, and W. G. Bechtel and G. N. Irvine have been appointed to fill these vacancies.

The Editor is indebted to the members of the Editorial Board for their helpful counsel and advice during the past year. Also, thanks are due to many members of the AACC as well as to other scientists who have acted as reviewers.

W. F. GEDDES

Report of the Editor of CEREAL SCIENCE TODAY

We have continued to be most fortunate in securing excellent cooperation from many individuals both within and outside the AACC in providing editorial material that we felt would be interesting and useful to our readers. We welcome constructive criticism and suggestions that will be helpful in attaining our goal of providing a publication that will have maximum possible value to our Association and to its individual members.

During the past year we have published a series of articles describing various organizations that are supported by or serve the technical interest of cereal processing. This series has included articles on the Corn Industries Research Foundation, the Nutrition Foundation, the American Institute of Baking, the Wheat Flour Institute, the Quartermaster Food & Container Institute, the Glutamate Manufacturers' Technical Committee, and the Western

and Northern Utilization Research and Development Divisions of the U.S. Department of Agriculture. Plans have been made to continue this series including additional government laboratories, educational institutions, and research institutes in other countries. A series of columns by AACC officers describing the duties of their positions was very well written; they certainly should have added to every member's understanding of the qualifications necessary to successfully fill these positions and increased everyone's appreciation of the services rendered to the Association by its officers.

We did publish a few technical committee reports. We feel that there should be more of these, since such publication can enhance considerably the value of these committees to the membership. Recently published articles have described the technology of macaroni products and dry milk products. Awaiting publication is a comprehensive manuscript on rice cultivation, processing, grading, and use.

Two new editorial departments have been added. These are "Washington Highlights" and "Laboratory Helps and Gadgets." Several Letters to the Editor have been published. More will be welcomed.

P. E. RAMSTAD

Report of the Managing Editor of Association Publications

It is my pleasure to report that during 1958 both *Cereal Laboratory Methods* and Monograph II reached and passed the break-even point. The small surplus that will accumulate from further sales of these books will be used to begin work on the next editions. As you will note from the following committee reports, work has already started on Monograph III and the 7th edition of *Cereal Laboratory Methods.*

As the Treasurer has reported, CEREAL SCIENCE TODAY continued to operate at a loss during 1958. By exercising strict budgetary controls, CST expenses were maintained at the 1957 levels despite increases in printing, etc. The difficulty arose in lack of income. Our revenue failed to meet expectations chiefly because of lagging advertising sales. This condition was experienced by most business publications during 1958. The outlook for 1959 looks good but could be disappointing if we do not take full advantage of our special position in the cereal industry. Each of us must sell the AACC and its publications at every opportunity if we are to succeed. Constantly remind your supplier of the importance of advertising in CST. Such advertising will benefit both the supplier and the consumer as well as every single member of the AACC.

The recent nonmember subscription increase for CEREAL CHEMISTRY will be felt this year. While 1958 was one of the leanest years for CC in a long while, 1959 should be above average. Our revenue will again compensate fully our production costs. Subscriptions continue to rise with the total now at 2,269. Seventy foreign countries now receive CC regularly.

R. J. TARLETON

Advertising

The Committee confined its activities this year to writing advertisers, thanking them for their intelligent use of CEREAL SCIENCE TODAY or urging nonadvertisers to direct their agency or department manager to contact the Committee for a summary of readership interest and level of readership. About 75 letters were sent.

DAVID L. CARPENTER, *Chairman*

Corporate Membership

The committee has never met, but has organized a drive which is showing some small success. From the United Bakers' Bureau listings and from industries allied to the baking business, as well as manufacturers allied to the milling industry, names were selected of those who might well afford to become corporate members of our Association. By February 18 these companies were circularized with a letter, personally signed by the committee member in their particular district or by the member who was best acquainted with the company being solicited. This letter was followed by sample copies of both publications, CEREAL SCIENCE TODAY and CEREAL CHEMISTRY.

The original letter described this literature, and in itself was a formal invitation to become a corporate member. Since February 18, when the invitations went out, six have signed up for memberships.

This committee was charged with the responsibility of building up the corporate memberships which were showing a sharp decline, after the increase in cost to $50 per year.

G. E. FINDLEY, *Chairman*

Membership Applications

During the period April 28, 1958, through March 2, 1959, 86 applications were processed by the Committee. Of these, 81 were active members and 5 were sustaining.

Breakdown of new active members: U.S. and Canada, 72 new members, 5 of these from Canada.

Foreign memberships were approved as follows: Australia, 2; Cuba, 1; China (Hong Kong), 1; England, 2; Japan, 3.

ROBERT B. KOCH, *Chairman*

Monograph Series

The projected Monograph III is to cover the cereal chemistry of wheat and its products. An outline comprising 16 chapters has been approved by the Monograph Committee. Authors for each of the chapters were also suggested by the Committee. Acceptance has been obtained from authors for all of the 16 chapters. About 6 chapters will have more than one author.

Chapter outlines have been discussed with each of the authors. Nine finalized chapter outlines have so far been received. Most of the authors are trying to do the major work of assembling their information before summer.

I. HLYNKA, *Editor*

Nominating

The nominating ballot contained nine names for three positions, the president-elect, secretary, and a member-at-large of the Board of Directors. From these nine names, six were chosen by the Association mmebership in accordance with the Constitution, to appear on the election ballot for the three positions.

Your committee wishes to thank the various Local Section Officers and other individuals responsible for the preparation of such an excellent ballot. The committee particularly appreciates the prompt action of the various Sections.

L. F. MARNETT, *Chairman*

Publicity

Coverage of events and close contact with and effective reporting by local newspaper reporters were greatly facilitated and improved by the effective efforts of the local publicity committee members at last year's meeting in Cincinnati. As a result of their efforts, a number of good stories appeared in the local papers. Attendance at the meeting by representatives of the trade press was somewhat lighter than usual, although all the major trade publications and a number of scientific journals participated in the coverage, using material supplied by the committee. This consisted of a number of prepared news releases and a collection of photographs taken by our cameramen during the meeting.

Again, this experience emphasizes the importance of strong publicity development and coordination on the local scene. The committee feels that each local section should participate in the activities of the National Association's committee, with the appointment of a member interested in assisting both the local and the national publicity effort. It is felt that active participation in the committee's efforts by the local sections will result in more continuous and effective publicity for the annual meetings and will be particularly helpful to the sections as they become responsible for the meetings. A recommendation to this effect is being submitted for consideration.

An outline of the publicity schedule to be followed for the main events covering the Washington, D.C., meeting was coordinated with the chairman for local arrangements in Washington. This was done during the Cincinnati meeting and this practice will be continued, as nearly as possible, in order to assure a coordinated effort and that publicity material reaches St. Paul well before publication deadline dates.

The committee has been instructed to direct a considerable part of its effort this year toward securing better coverage of the annual meeting by the trade and news press. The use of the press room is to be continued, and press tables are being provided in convenient locations in the meeting rooms for the use of reporters. In addition, as many news releases as possible will be secured and made available to the press during the meeting. A written invitation to attend the meeting is being mailed in advance of the meeting to all known trade and news agencies who might be interested, and any others are invited to attend and make known their interest to the committee. Suggestions made by several of the trade publications in the interests of securing better accommodation of press representatives attending the meetings have been very helpful and are appreciated. The committee will welcome further suggestions and will continue its efforts to make reporting the AACC meetings a more convenient and pleasant experience.

WILLIAM SIMCOX

Thomas Osborne Medal Award

The Committee has no report to make at this time.

BETTY SULLIVAN, *Chairman*

TECHNICAL COMMITTEES

Technical Policy Committee

The Technical Policy Committee is charged with the responsibility of establishing policy regarding technical methods. It is charged with appointment of members t execute the program of the Association relating to techni cal matters. To guide the work of the technical committee the following "Code of Regulations" has been developed It is submitted hereby for consideration of the membership.

"Code of Regulations" for AACC Technical Committee Activities

Organization

The work of the various technical committees shall be organized and supervised by a Technical Policy Committee, the membership of which, except for the Chairman, shall consist of the chairmen of the technical committees.

The Chairman of the Technical Policy Committee shall be appointed by the President not less than 60 days before the annual meeting of the Association. He shall serve for a term of one year but shall be eligible for reappointment.

The Chairman of the Technical Policy Committee shall preside at all meetings of the Committee, shall act as liaison between the technical committees and the Board of Directors, and shall recommend to the President, chairmen and members of the technical committees. The President may request the Chairman of the Technical Policy Committee to attend meetings of the Board of Directors.

The chairmen of technical committees shall be appointed by the President not later than 30 days before the annual meeting of the Association. All other members of the technical committees shall be appointed by the President not later than 30 days after the annual meeting. All members of technical committees shall serve a period of one year, terminating at the close of the annual meeting of the Association, but shall be eligible for reappointment.

Technical committee membership shall be restricted to national members of the Association, including authorized representatives of corporate members. Other persons working with technical committees may be designated as collaborators.

Technical committees and the Technical Policy Committee shall hold meetings in conjunction with the annual meetings of the Association and may hold other meetings at the discretion of the chairmen.

Annual Budget

Whenever technical committee expenses that cannot be borne by the committee members or their employers are anticipated, the Chairman of the Technical Policy Committee shall prepare and present an annual budget to the Board of Directors for consideration. This budget shall outline specific projects which require the expenditure of funds and recommendations as to the amount to be allocated to each.

Annual Reports

Each technical committee shall prepare an annual progress report which shall be submitted to the Chairman of the Technical Policy Committee 60 days prior to the annual meeting. This report shall be presented at the annual meeting of the Association in either closed or open committee meetings and published in CEREAL SCIENCE TODAY. Copies of each annual report shall be filed with the Chairman of the Technical Policy Committee and the Managing Editor of Association publications.

Classification of Methods

When a new method of analysis or a revision of an existing method has been developed by a technical committee through collaborative effort to the point where, in the opinion of the Committee, it will serve a useful purpose and give reliable results, the technical committee shall present the method, together with supporting evidence of its usefulness and reliability, to all members of the Technical Policy committee at least 30 days before an annual meeting of the Association. The method shall then be considered for adoption by the Technical Policy Committee at its next regular meeting. If it is adopted by the Technical Policy Committee, it shall be published as a *First Approval* in one of the Association's periodicals, and also in the next edition of *Cereal Laboratory Methods*, unless further action on the method is taken in the meantime.

The technical committee responsible for a *First Approval* shall continue to study the method through collaborative effort. If any appreciable change in the method is considered desirable, a revision of *First Approval* shall be recommended in the same manner as was involved in the original *First Approval*. Adoption and publication of the revised method shall be accomplished in the same manner as for the original *First Approval*.

When the technical committee responsible for *First Approval* is fully satisfied with the method, it shall present the method together with convincing evidence of its reliability to all members of the Technical Policy Committee at least 30 days before an annual meeting of the Association. The method will then be considered for *Final Approval* by the Technical Policy Committee at its next regular meeting. Final adoption of any method as a *Final Approval* shall be by a majority vote of members present at a regularly scheduled business meeting of the Association. Notice of such action shall be published in a forthcoming issue of CEREAL SCIENCE TODAY and the method shall appear in the next edition of *Cereal Laboratory Methods*. Modification of *Final Approval* may be made only after extensive committee study and convincing evidence that modification is desirable.

Revision of CEREAL LABORATORY METHODS

Revision of *Cereal Laboratory Methods* shall be a responsibility of a subcommittee of the Technical Policy Committee. The membership shall consist of the following:

(a) Revision chairman selected from the Association membership.
(b) Managing Editor of Association publications.
(c) Chairman of the Technical Policy Committee.
(d) Two members chosen from the Technical Policy Committee.

Appointment of membership on the Revision subcommittee shall be for a period of 5 years or until a revision of an issue of *Cereal Laboratory Methods* has been completed. Vacancies which may occur during a given interim shall be filled by appointment by the President upon recommendation of the Chairman of the Technical Policy Committee.

It shall be the duty of the Revision subcommittee to establish ways and means to provide a currently valid cereal laboratory methods book. Their recommendations shall be reviewed by the Technical Policy Committee and presented to the Board of Directors for approval.

It shall be the duty of the subcommittee to perform all editing and associated activities in connection with issuance of *Cereal Laboratory Methods*.

It shall be the duty of the Chairman of the Technical Policy Committee to recommend appointment by the President, of Technical Committees who shall be responsible for review and classification of old methods, either Tentative or Standard, prior to revision of *Cereal Laboratory Methods*.

It shall be the duty of the Chairman of the Technical Policy Committee to provide the Revision Committee Chairman with copies of new methods that are developed and classified by the technical committees.

Cooperation with Other Societies

Cooperation among scientific societies with common problems and interests is to be encouraged and fostered.

After the consultation between the Chairman of the Technical Policy Committee and the presidents of the societies involved, joint committees between societies may be formed whenever a mutual problem exists.

(Adopted at Board Meeting, Cincinnati, Ohio, April 11, 1958)

The work of the technical committees is being directed specifically to assist with the preparation of the 7th edition of *Cereal Laboratory Methods*. A total of 15 technical committees were functioning in April, 1958. During the ensuing summer months, 9 additional technical subcommittees were appointed. Since January 1, 1959, the following new technical committees have been appointed: Amino Acid Analysis, Proximate Analysis of Cereal Products, Microorganisms in Cereal Products, Macaroni Products Analysis, Color Analysis, Enzyme Assay, Experimental Milling, Fat Acidity, Food Additives, Flour Particle Size Analysis, Definition of Terms, Oxidizing and Bleaching Agents Analysis, Organic Acid Analysis, Pigment Analysis, Starch and Dextrin Analysis, Sampling of Cereal Products, Statistics and Experimental Errors, and Sugar Analysis.

Help with the technical committee work is solicited. Assignment to a given committee can be achieved by writing the chairman of the Technical Policy Committee.

During the past year the technical committees reviewed the 6th edition of *Cereal Laboratory Methods* and have compiled a list of errata which will be soon published.

The specific activities of several of the technical committees are published herewith and attest to the wide scope of interest of the members of the Association in Technical matters.

JOHN A. JOHNSON, *Chairman*

Bran in Flour

A method for determination of bran in flour was published in CEREAL CHEMISTRY, vol. 35, p. 380, 1958. The method involves dispersion of the flour in alcoholic isopropanol followed by filtering, centrifugation, washing with water, and measurement of the volume of the total particles. This method will be submitted to collaborative study during 1959.

WILBUR L. DEATHERAGE, *Chairman*

Cake Flour Testing

This committee has not actively pursued additional collaborative work during the past year. In lieu of this type of effort, all previous committee work has been scanned and, where possible, analyzed statistically, in order to gain more definite direction for future work. It is hoped that this approach will be useful in bringing the fruitful output of this group to a successful conclusion during the next year.

D. B. PRATT, JR., and HARRY MILLER, *Co-chairmen*

Cookie Flour Testing

The Committee has continued to study conditions of the cookie tests that influence the "spread factor." The important conditions and their effect on cookie spread will be discussed at the committee meeting during the annual meeting in May.

LESTER J. BRENNEIS, *Chairman*

Cracker Flour Testing

This committee has been actively engaged in study of the effect of bulk flour-handling methods on quality of flour for cracker production. This will be reviewed by the committee during the annual meeting in May.

JAN MICKA, *Chairman*

Feed and Feedstuffs Analysis

The Feed and Feedstuffs Analysis Committee is composed of several subcommittees as follows: Drugs and antibiotics, Robert C. Wornick, chairman; Mineral analysis, Edward E. Chapman, chairman; Proximate analysis, Gerald D. Miller, chairman; Vitamin analysis, Ernest F. Budde, chairman.

The members of the committee reviewed and examined sections of the 6th edition of *Cereal Laboratory Methods* pertaining to feed analyses. The resulting information is to be used in preparing an errata sheet for the present book. Some of the comments received, especially those pertaining to assay methods for Arsanilic Acid, Nitrophenide, Nitrosal, Phenothiazine, and Sulfaquinoxaline will be useful considerations in developing procedures for the forthcoming 7th edition of *Cereal Laboratory Methods*.

The tentative procedure for sampling feeds has now become official. This official method appears on page 112 of the 1959 publication of the Association of American Feed Control Officials. Although this sampling procedure does not cover details such as sampling of materials like cubes, basically it is information which can be incorporated in the revised AACC methods manual.

The various subcommittees of the Feedstuffs Analysis Committee are assembling assay procedures. They are to be examined as to reliability and will be classified either as *First Approval* or, if proved reliable, will be given *Final Approval* classification.

It is recommended that these subcommittees be enlarged as to membership to aid in achieving better progress in their individual and specific fields.

The Feedstuffs Analysis Committee will meet at the Statler Hotel, Washington, D.C., at the forthcoming AACC meeting. Any who are interested in these discussions are welcome to attend.

MAX COOLEY, *Chairman*

Flour Specifications and Approved Methods

The Flour Specifications Committee has continued its study of quality factors pertinent to sale and purchase of flour. It met in Chicago in October and finalized its recommendations. These are now being formalized for presentation in CEREAL SCIENCE TODAY and will be presented to the Association membership during the annual meeting in May.

GEORGE GARNATZ, *Chairman*

Physical Dough Testing

Excellent progress has been made during the past year, with the close cooperation of farinograph equipment manufacturers, toward standardization of performance characteristics of 300-g. mixing units. Agreement has been obtained concerning calibrations which yield good agreement in major curve characteristics. This phase of the work will be completed soon with the establishment of adjustment specifications for curve shape factors as well. The ultimate objective is to attain specifications which will provide uniform, replicable mixing unit calibration and performance.

The committee has also begun to formulate methods for other dough rheological devices and techniques not currently appearing in *Cereal Laboratory Methods*.

MAX MILNER, *Chairman*

Prepared Baking Mixes

The Prepared Baking Mix Committee is divided into five subcommittees. The chairmen of these subcommittees are as follows: Plasticity of fats and shortenings, Donald C. Meek; Hydration of powdered milk, C. K. Sherck; Hydrolytic rancidity of fats, Edward I. Feigon; Rate of reaction of leavening agents, Richard Haynes; Yeast-raised sweet products, David E. Downs.

Subcommittee on Rate of Reaction of Leavening Agents — Richard D. Haynes, Chairman

The immediate objective of the subcommittee was to test the suitability of the new Acid Release Characteristic (ARC) test for characterizing the reactivity of sodium acid pyrophosphate (SAPP). It is anticipated that this test may prove to be accurate, simple, and fast enough for routine analysis by the average mill laboratory.

During the year five laboratories, represented by members of the subcommittee, participated in tests of the method. Ninety unknown samples of SAPP were evaluated for reactivity by the ARC method. A statistical analysis of the results will be made to show the significance of variations between laboratories, operators within laboratories, and between four grades of SAPP known to vary in reactivity. Reports of the results will be made available for those interested in the work at the national meeting in May, 1959.

Subcommittee on Rate of Hydration of Skimmilk Powder — C. K. Sherck, Chairman

During the year, the committee chairman visited several milk drying plants to discuss the problem of rate of hydration of dry milk powders. A survey was made of available methods for testing for rate of hydration of milks. No suitable methods exist. A viscosity method employed by the American Dry Milk Institute and a chemical method employing tetrasodium pyrophosphate and potassium polymetaphosphate has been suggested. These will be discussed during the Annual Meeting in May.

The committee was engaged in review of the 6th edition of *Cereal Laboratory Methods* in preparation of a list of errata. Future activities involve methods for the 7th edition.

W. F. SCHROEDER, *Chairman*

Revision of CEREAL LABORATORY METHODS

The Revision Committee has set the following deadlines for the 7th edition of *Cereal Laboratory Methods*:

Technical committee reports on methods in 6th edition and submission to membership	May, 1960
Technical Committee reports on new methods	May, 1960
Revision and write-ups of new methods	Feb. 1, 1961
Submission of new methods to membership	May, 1961
To printers	June 1, 1961
Publication	Feb. 1, 1962

Special attention will be given to editing the 7th edition to assure uniformity of style in presentation of the methods.

All methods in the 6th edition are to be reviewed by technical committees and approved or revised as required. Obsolete methods are to be deleted. New methods will be reviewed by appropriate technical committees. Through their inclusion, it is anticipated that the scope of *Cereal Laboratory Methods* will be broadened to include chromatographic, electrophoretic, and other techniques which will be of use to cereal chemists in control, research, and development laboratories.

Over 20 technical committees are already engaged in review of methods; there will be at least 40 committees reviewing methods when all are activated. This broad coverage will enable each method in the 7th edition to carry the designation of *First Approval* or *Final Approval* by an active technical committee.

As a further means of keeping *Cereal Laboratory Methods* up to date, the Revision Committee submitted to the President for action by the Board of Directors a recommendation that the 7th edition be published in loose-leaf form. New methods could then be added and old ones revised at any time without the necessity of printing an entire new edition. *Cereal Laboratory Methods* would thus be at any given time a collection of the best methods available at that time.

MAJEL M. MACMASTERS, *Chairman*

Test Baking

The Test Baking Standardization Committee is investigating the relative farinograph absorptions of a yeasted dough as compared to a nonyeasted dough. A progress report of this work will be given at the Technical Committee meeting, Tuesday afternoon, May 5, 1959.

LESLIE LONGSHORE, *Chairman*

Sedimentation Test

Two series of samples of flours have been submitted for further collaborative study of the sedimentation test. The results of the last of the two series are now being tabulated and analyzed. A report of these finding will be presented at the annual meeting in May.

WALTER T. GREENAWAY, *Chairman*

Sanitation

The Sanitation Methods Committee has conducted three Insect Fragment Identification Training Schools, one each at Albany, California, New York, and Chicago. The preschool testing sample has shown an extremely wide range in insect fragment counts. Course work has confirmed the suspected lack of uniformity in technical background and training, and at the same time has demonstrated a means of improving proficiency in this work. This training work, as distinct from other attempts in this direction, has based insect fragment recognition on a knowledge of insect micromorphology and the use of species-characteristic micromorphological structures and fragmented structures in insect fragment recognition.

It is recommended that future training follow the leads developed in this work.

KENTON HARRIS, *Chairman*

Soybean Products Analysis

The Soybean Products Committee has continued its study of the Schramm-Aines colorimetric method for assay of urease activity in heated soybean products. This method has been compared with the Coskey-Knapp and titration methods. This work is being done in cooperation with a joint committee of the AOCS. Report of findings will be presented at the annual meeting in May.

L. R. BROWN, *Chairman*

Vitamin and Mineral Analysis

Experimental studies are being made of each step in the fluorometric procedure for riboflavin, including a comparison of results of analysis by four of the most widely used methods. As a part of the study, determinations are being made of the effect of varying the amounts of reagents and conditions of treatment such as time, temperature, etc., in each step, so that the limits of permissible variation will be found. The test materials for this study are enriched flour, egg noodles, and a toasted breakfast cereal.

On the basis of the results, a procedure will be developed which will be subjected to collaborative tests next year.

W. G. BECHTEL, *Chairman*

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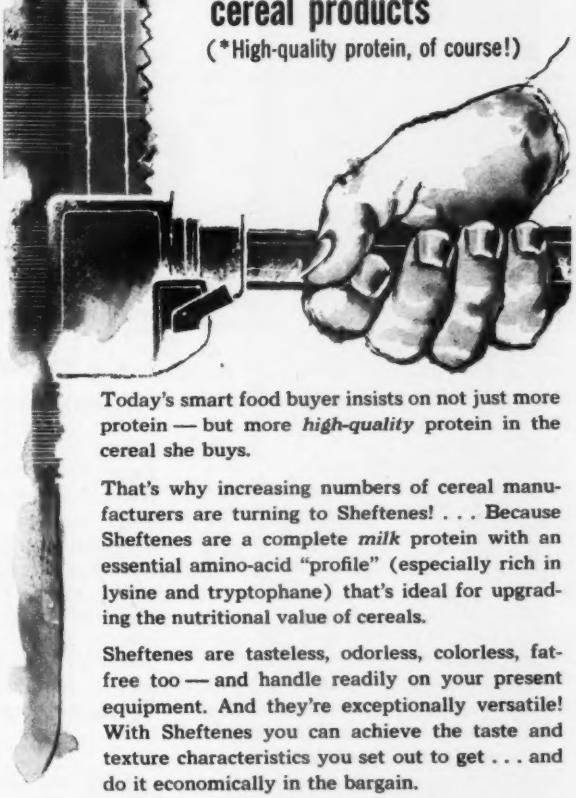

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People, Products, Patter

• • • People

G. Alexander, Merck & Co. representative, retires.

E. Bleile of Garland Milling Co., Greensburg, Indiana, now with Molinos de Puerto Rico, Cataro; is retaining membership in Cincinnati Section, AACC.

Faye Buck, formerly with Flour Mills of America, now with the new mill in Haiti.

James W. Hoelscher appointed manager of market research for Wallerstein Co., New York; was affiliated with Ohio Oil Co. between 1948 and 1951, and with Freeport Sulphur Co., 1953-1958.

Arch McClure appointed manager of Quaker Oats Co.'s plant at St. Joseph, Mo.; has been assistant manager of plant at Cedar Rapids, Iowa, since 1955. He succeeds **C. R. Martin** who is retiring after 22 years at St. Joseph in charge of plant operations and cereal and feed sales. **G. F. Kerns** promoted to handle cereal sales in West Central region and **Ray N. Ammon** to head feed sales, St. Joseph division.

Don F. Mills appointed to sales staff of Givaudan Flavors, Inc.; will represent the company in New York-Connecticut area.

Mike Padley, metropolitan New York Sales representative for Sterwin Chemicals, Inc., honored on 40th anniversary of starting with Sterwin's parent company, Sterling Drug Inc. **J. A. Revord, Lee Soklich,** and **Gordon Weed,** also members of Sterwin sales organization and veterans in the baking industry, presented with service pins marking 15 years of employment; respectively they represent the company in Chicago district, Los Angeles, and Pennsylvania.

George D. Pickett joins Western Condensing Co., Appleton, Wisconsin, as technical service representative for Foremost Lactose.

R. M. Sandstedt and **T. J. Schoch** will appear on the program of the annual Starch Convention of the Association of Cereal Research, Detmold, West Germany, April 21–23.

Stuart A. Sather joins Proctor & Gamble's products research department, Foods Division.

Clifford A. Scott becomes regional sales manager for new Northwest region, agricultural products division of Merck & Co. Inc., Chemical Division; will supervise sales of Merck animal-health and feed products in the Dakotas, Nebraska, Iowa, Minnesota, and a portion of Wisconsin, with headquarters in Minneapolis. **B. W. Carmichael** will continue handling sales of Merck food and industrial products, including vitamins and vitamin enrichment mixtures for flour millers, in the same area. **W. M. Bruso,** Chicago, continues as region manager for Illinois and surrounding area.

• • • Products

Scientific laboratory equipment. E. H. Sargent & Co. have opened a new building to serve laboratories throughout the East, at 35 Stern Ave., Springfield, N. J., just outside Newark. The building has complete warehouse stocks, manufacturing facilities, an instrument repair shop, and a custom glass-blowing shop, along with modern offices geared to process orders promptly. Other Sargent divisions are in Birmingham, Ala., Dallas, Texas, and Detroit, Michigan.

• • •

New stereomicroscope. Bausch & Lomb Optical Co. announces a new line of stereomicroscopes, featuring "StereoZoom" magnification and the new Power Pod, a dust-sealed optical system. The design of the instruments marks a complete departure from conventional methods used to achieve magnified, three-dimensional images. It eliminates the need for the usual separate lenses and nosepieces and there is no image "blackout" when power is changed. Without sacrifice of quality, the instruments are priced about one third lower. Write for catalog D-15, Bausch & Lomb Optical Co., 15 St. Paul St. Rochester 2, N.Y.

• • • Patter

Feed Microscopists' meeting. The American Association of Feed Microscopists have selected Quincy, Illinois, as the place for their seventh annual meeting, April 27 to 29 as the dates, and the Lincoln-Douglas Hotel in Quincy as headquarters. The Moorman Manufacturing Co. will be industry hosts to the Association. Tentative plans call for a workshop session, and a tour of Moorman's manufacturing facilities and extensive research farm.

• • •

Starch convention. The (European) Association of Cereal Research will hold its annual starch convention in Detmold, West Germany, April 21 to 23. Two well-known American starch chemists are to take part in the first day's program: T. J. Schoch will speak on "Characterizing the useful properties of starch"; and R. M. Sandstedt will acquaint the European scientists with his filmed work on gelatinization of starches and the structure of starch granules as revealed by enzyme digestion. Other participants are from various cities and leading institutions in Germany, Jugoslavia, Hungary, Czechoslovakia, France, England, and Sweden.

The three-day program will be presented under the general headings given below, with a brief mention of individual subjects.

Research and testing methods: besides the contributions by Schoch and Sandstedt, other topics will be the origin of starch in the plant; starch and gluten protein in infant nutrition; behavior of starch opposite to organic solvents; soluble starches obtained by gamma-ray; phosphoric acid in potato starches; formol titration in protein determination.

Starch manufacture and techniques: the high-efficiency centrifuge; modern separators; manioc starch plants; drying of steeping water; starch and gluten of air-sifted wheat flours; transport of unpacked starch.

Starch fractions and derivatives: a continuous hydrolysis method; physicochemical properties of sugar solutions; Food Law of 1958 and its importance; use of starch and dextrins in the British paper and adhesive industries.

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AACC

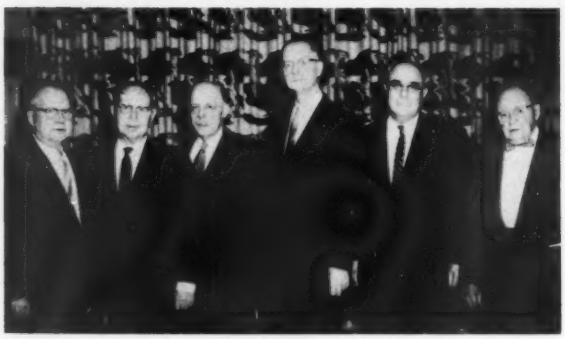
LOCAL SECTIONS

Niagara Frontier Section members and ladies gathered on the evening of March 9 at International Breweries, Inc., Iroquois Division, Buffalo, for a combined meeting with Western New York Section of IFT. William Kazanjan of International, a local section member and former chairman, was both host and speaker. He talked about "Recent advances in brewing technology," and showed a color film entitled "Hops growing." A guided tour of the plant and laboratory at International and a social hour in the Brewery Rathskeller rounded out a fine affair.

Here are some further details about the February meeting and 30th anniversary celebration that were not at hand when the March issue went to press:

Robert Segmen of Meyer Malt Co. was ready with his camera, and some of the shots he took are reproduced here. National President Clinton L. Brooke had the honor of cutting the birthday cake.

Clayton Sander of Eastern States Farmers' Exchange, Inc., as local-section historian, covered news items of 1928 taken from newspapers of that year. Minutes of the first meeting were read, including names of the original officers and the 25 pioneer members, six of whom were present and were introduced, each giving a short speech. They were Fred Hessel, Albert Reiser, Major S. Howe, Chester Bald, and Frederick T. C. deLeeuw (see cut). Major Howe, who was then past president of AOM, was guest speaker for that first meeting, on the subject "District organization."



L to R: Chester Bald, Fred Hessel, Albert Reiser, N. L. Gregory, Frederick T. C. deLeeuw, Major S. Howe.

L to R: Vincent Lawson, Stanley Skelskie, Charles Bronold, Franklin Wagner, Robert Van Burek, Clinton L. Brooke.

To mark the anniversary in a memorable way, handsome scroll commemorating the organization the Section, then the Niagara Frontier Cereal Che ists' Association, was presented to vice-chairman Ro ert Van Burek by Clinton L. Brooke.

Part of the Niagara Frontier group.

• • •

Canadian Prairie Section held their February dinn meeting on the 17th in the Grain Exchange Buildin Winnipeg. Members had the unusual opportunity an pleasure of hearing as their guest speaker A. H. Blok ma of The Netherlands, a graduate of the Universit of Amsterdam, who is now working at the Grain Re search Laboratory. His topic was "Cereals in Hollan and some aspects of wheat protein research."

• • •

New York Section put on a Ladies' Night on Febru ary 10. The evening's topic could not fail to intere the ladies: "The consumer's interest in the Food, Dru and Cosmetic Act." Charles A. Herrmann, chief of th New York district FDA, explained three modes o legal action by which his hearers could help enforc the Act: namely, seizure, prosecution, and injunctio He went on to speak of labeling requirements an debunked various myths – that all disease is due t faulty diet; that soil depletion is the cause of malnutri tion; that foods are "overprocessed." In concluding, h placed on view various therapeutic devices for whic fantastic curative claims were made by their distribu tors. Questions that followed related chiefly to the role of vitamin supplements in modern diets and the limitation on the number of times prescriptions may be filled.

• • •

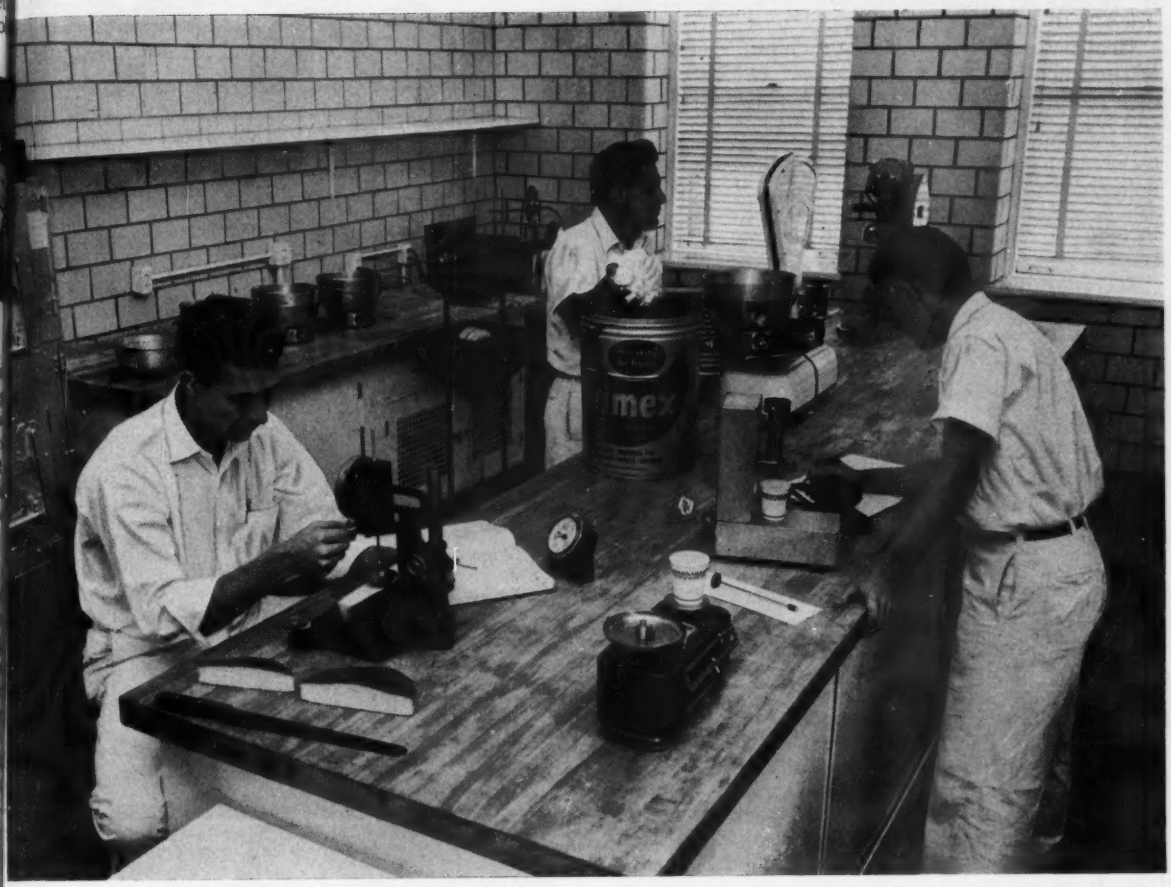
Cincinnati Section met on January 23 at Battelle Memorial Institute, Columbus, Ohio. The diversity of research being carried on there was demonstrated by a tour of the building, including stops for discussion of radioisotope work, electron microscopy, liquid culture of mushrooms, soft X-ray irradiation of food products, and purified crystal growth.

Opening the formal program, Radcliff Robinson of the Institute discussed soft X-rays from low-voltage X-ray tubes, used in sterilizing various foods. He said that they result in little loss of vitamins and flavors and no change in color of most products, but extensive appraisal of their effects is difficult under the present FDA ban on irradiation of foods.

Robert Holcomb of Ohio State University spoke on the microbiology of frozen foods. Freezing does not sterilize foods, he said, and in fact may render them more susceptible to infection after thawing, because of possible damage to cellular structure. In precooked frozen foods (such as TV dinners) some organisms survive cooking and freezing, even after oven heating.

Results of a cooperative experiment on delayed harvest of soft wheat were presented by Harry Loving, Mennell Milling Co., Kenneth Harkness of Ohio State, and Lewis Baker of Mid West Laboratories. Along with lowered moisture content (19.5 to 12.5%)

A corner of one of the famous Procter & Gamble laboratories at Ivorydale, Ohio. At P & G, product improvement goes hand in hand with the developments of science.



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from the first harvest on July 15 to the last on Aug. 5, the test weight per bushel went down from 57.3 lb. to 53.5 lb. Grain of the two early harvests was dried both at 140°F. and without heat.

Heat had no adverse effect on milling quality, Mr. Loving reported. Test weight, wheat and flour amylograph values, flour viscosity, Pekar color values (wet and dry), and bread quality were lower with lateness of harvest, and percent damage and discount rate were higher. Wheat amylograph and flour viscosity values reflected heating effects. Flour yield, protein, ash, and cookie spread were not affected significantly either by harvest date or drying method. No pearling or particle size tests were made.

Mr. Baker described a gassing-power test that was applied to the wheats in question; good correlation was found, he said, between gassing power and percent damage.

• • •

Midwest Section met on Monday, March 2, for cocktails and dinner. Roy C. A. Bradshaw of the Quaker Oats Company spoke on "Factors affecting starch gelatinization as measured by light transmission," a paper in which Eileen Brady shared in preparation. Mr. Bradshaw discussed the use of the light-transmission method and showed typical results for wheat and corn flours. He also explained the way in which starch gelatinization is influenced by protein, inorganic salts, fat acidity, and other factors.

• • •

Kansas City and Pioneer Sections held a joint meeting February 20 and 21 at the President Hotel, Kansas City, Mo. R. W. Shortridge, head of the Department of physical chemistry, Midwest Research Institute, spoke to the group on "Effects of atomic radiation on cereal products." He summarized the principal methods of food preservation and the shortcomings of each, then discussed the possibilities with radiation, its effectiveness, problems raised as to changes in flavors and odors, and comparative costs. Possibilities are excellent, he said, for combinations of radiation with refrigeration, heating, curing, dehydration, etc.

Elmer Modeer of the Staley Milling Co. talked about "Recent developments in feed nutrition," particularly feed additives and supplements which increase the value and effectiveness of feed formulas. He said that the ratio of calories to protein is very important, and told of approximately 40 products being added to feeds for various purposes and their consequent benefits and problems.

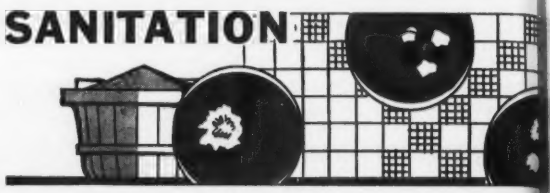
Roger Pratt of Wallace & Tiernan Co., with Karl Fortmann and Donald S. Eber assisting, presented a film on the Baker system of continuous mixing and panning of bread doughs, with commentaries. Mr. Pratt emphasized the uniformity and excellence of product, and the efficient, trouble-free operation of the new system of bread production, which he said is gaining wide acceptance and preference.

John A. Shellenberger, head of the Department of Flour and Feed Milling, Kansas State University, gave a talk entitled "My impressions of cereal technology in the USSR" – interesting sidelights on his recent trip to Russia.

Midwest Research Institute gave a very interesting tour, with about 30 chemists attending.

New Section members are John Halverson and Jim Lilley, both with Commander-Larrabee, in Kansas City, Mo., and St. Joseph, Mo., respectively.

SANITATION



Second Sanitation Training School Meets with Success

Thirty-nine registrants, representing virtually all are of the food industry, recently completed the second AAC Sanitation Training School in New York City.

The School, held from February 16 to 21 at the Ne York City Community College of Applied Arts and Sc ences, was sponsored by the AACC in cooperation wi the Food and Drug Administration. The Administration Kenton L. Harris and O'Dean L. Kurtz conducted th week-long course.

Facilities were offered gratis by the College of Applied Arts and Sciences. College President Otto Klitgord opened the session. President Klitgord and Dean Charles W. Laffin, Jr., extended their cooperation and helped make the School a success.

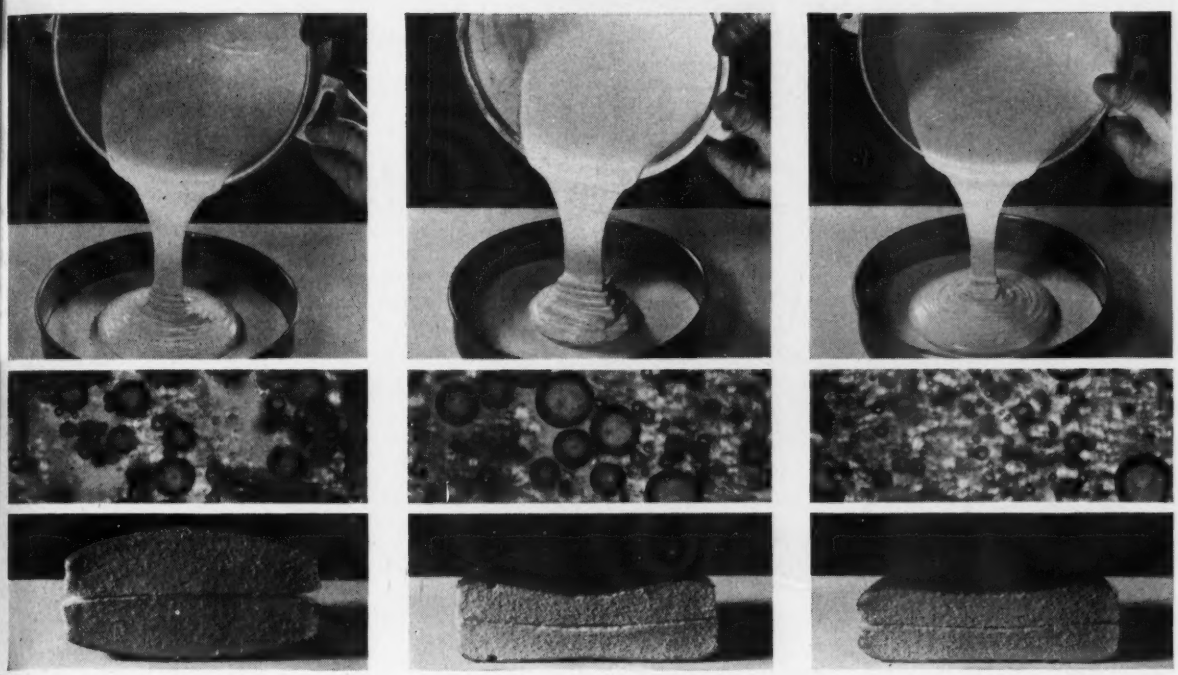
Nearly two-thirds of the thirty-nine students attending were from the New York - New Jersey area. Two students, working in this country under the assistance of the International Cooperation Administration and sponsored by the Governments of Israel and Jugoslavia, also attended the course.

Bausch & Lomb of Rochester, New York, donated the use of four microscopes and additional equipment valued at nearly $1,800.

Local arrangements on behalf of the New York Section were handled by Andrew J. Allgauer and Davis L. Kinnally, assisted by W. J. Simcox and Donald B. Davis of the Section.

Sanitation Training Schools are not limited to AACC members but are open to all personnel in the food industry. Next school — April 13–18, Chicago. Write to: Stanley McHugh, American Bakeries Co., 919 N. Michigan Ave., Chicago.

Cake drama in three acts, starring the emulsifier



I II III

Curtain raiser Here is a rather thick but pourable batter with a very slight curdle. Below it, a peek into the live batter, one hundred times actual size, reveals a wide distribution of air bubble sizes. Not all the fat has been used up in making bubble walls. Darker areas of reserve fat are seen by the naked eye as curdle. Then, as the relatively weak-walled bubbles gently break during baking, the fat assumes its second role of coating the gluten-and-starch framework. First-act climax: a good cake. Excellent volume, fine and even grain, thin cell walls, whiteness.

Plot thickens It's the same formula otherwise, but emulsifiers have been chosen to make a very smooth, very thick batter. In the photomicrograph you see why there's no curdle: all the fat has been used in making big, thick bubble walls. You also see why the batter is so viscous: the big bubbles get in each other's way. Here, alas, the emulsifier builds *too much* strength into the bubble walls. Suspense. By the time the bubbles finally do break, considerable gas pressure has built up. The sudden release of energy shatters the still tender skeletal structure. Tragedy!

Anticlimax Now we have swung off to another extreme, using in the same formula emulsifiers that produce a very smooth and very thin batter. Note the small, uniform bubbles floating in a sea of liquid. (There's your low viscosity.) Note the fat all used up in making the bubbles strong. (No curdle.) Finale: in the oven, sudden energy release produces the same collapse as in Act II, with thick cell walls and open grain.

Program note: The offstage voice advancing hypotheses about bubble strength is that of one batter theoretician among many. He has never been inside a cake in the oven.

EPILOGUE: Texture, both of the batter and of the cake, depends on the emulsifier. With *Myverol® Distilled Monoglycerides*, the texture is subject to practical engineering control, regardless of the fine points of underlying theory. Such control is both possible and economical because we, in our own production, have the precise control that comes from segregating fats as vapors. Interested in what we can do for you with this unique power? For particulars, write ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies, Inc., West Coast • Charles Albert Smith Limited, Montreal and Toronto.

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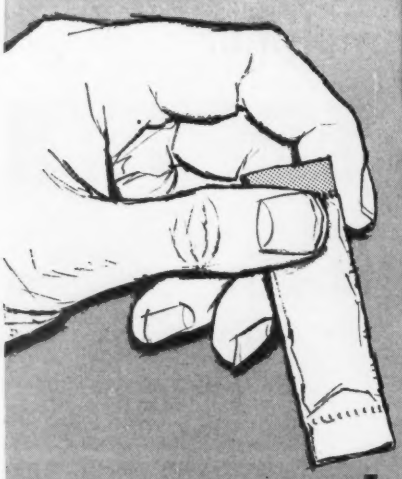

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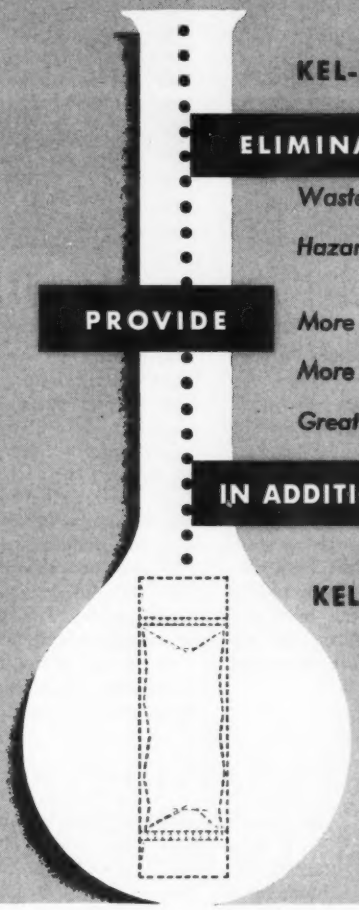
To use, simply drop one packet into flask



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May 3 thru 7, 1959

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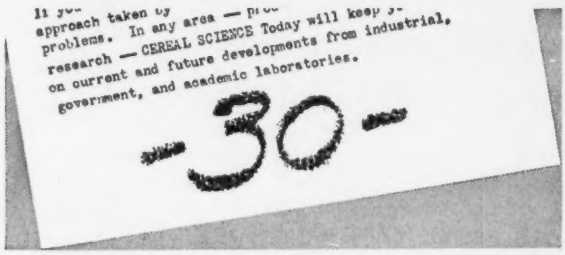
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-30-

FINAL MEETING PROGRAM

The final program of the 44th Annual Meeting, AACC, is now being edited and will be sent to the printer before this issue reaches you.

Probably the most outstanding thing you will notice is its size, larger than any other program. The total number of papers both technical and nontechnical will be about 70. This means that concurrent sessions are a must if we are to have a four day meeting.

You will note too that the variety of subject matter is almost endless. Emphasis will be on the applied side, but one of the most outstanding symposiums we have ever held will concern itself with fundamental research. This is the special session planned for Monday afternoon and it will be the highlight of the meeting.

If you are having trouble in selling management on your attendance at the meeting I urge you to show him or them this issue of CST and particularly pages 100 to 103. No finer technical meeting has ever been held in the field of cereals.

And one last word about Washington. We are having the largest group of technical exhibits ever assembled at an AACC meeting. Many new ideas will be shown and talked about. New products and new equipment will be demonstrated. It will pay all of us to visit these exhibitors sometime during the meeting to learn what's new.

MAY ISSUE DELAYED

The next issue of CST normally gets mailed about the 20th of April. This is the May issue. However, since our meeting is after that date and we do not publish a June issue, we've decided to delay the May issue mailing until May 15. In this way we will be able to report the highlights of the Washington meeting while it is still news. We also hope to begin publication of the papers appearing on the Monday afternoon special symposium.

DO YOU ALWAYS AGREE?

It is commonly said that those of us with a gripe are the first to take pen in hand and let the world know about it, while we never think of letting anyone know if we approve. It's an effort to write, even for the pro's. Thus it's not difficult to understand why most of us prefer to speak our mind rather than to write it.

This approach is fine if we always have an opportunity to speak to everyone with whom we agree or disagree. However, the ideal situation rarely exists and we must resort to the written word if we wish to make our thoughts known.

The point of this little discourse is to merely ask, "Do you always agree with everything said in CST and with all AACC policies and operations?" It would seem highly unlikely if the answer was an emphatic "Yes," but who's to know it isn't unless you bother to let us have your opinion?

Of course this doesn't mean that every one of us not liking something can have it changed by merely writing a letter. It does mean that unless you express your opinion it will never be given consideration.

Let all AACC members keep in mind that CST is their journal. It can be whatever the majority wish it to be. It provides you with a place to publicly gripe or approve (Letters to the Editor). All you have to do is to let the Association officers or editors know what you think and what you want and they'll try to comply. Meanwhile your elected officers will continue to provide you with services and publications they feel will best serve your needs.

RJT